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Federal Marketing Orders for Fruits, Vegetables, Nuts, and Specialty Crops

Nicholas J. Powers



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Federal Marketing Orders for Fruits, Vegetables, Nuts, and Specialty Crops. By Nicholas J. Powers. Commodity Economics Division, Economic Research Service, U.S. Department of Agriculture. Agricultural Economic Report No. 629.

Abstract

Many marketing orders have regulations for funding promotion and research and establishing package, container, grade, and size requirements. The intent of these regulations is to increase sales by increasing buyer awareness of the product, developing more desirable products, and reducing marketing costs. A few marketing orders control the volume of produce entering certain markets and are intended to even out supplies and prices over time. These regulations can restrict sales of high-quality produce to the fresh-use market and boost farm prices for a given quantity. However, production increases stimulated by the higher prices subsequently reduce them.

Keywords: Federal marketing orders, free rider, promotion, research, package, container, grade, size, volume controls, and economic effects.

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Preface

This report explains why there is a Federal marketing order program for horticultural crops, its development and operation, and its impact on market participants. The sections on the evolution and operation of marketing orders explains the rationale for orders and the mechanics of initiating and administering marketing agreements and orders and identifies changes in the number, type, and industry structure of crops with orders over time. Effects of the regulations on market participants, such as growers, input suppliers, food processors, and consumers, are discussed in terms of the direction of change in farm prices and revenues, marketing margins, input use, output, market utilization, retail price, and consumer expenditures.

The report is written principally for persons affected by or interested in the program, such as farmers, marketers, food processors, staff members at public and private organizations, and consumers.

Similar questions and issues on marketing orders were addressed in earlier Federal Government publications, including *Federal and State Enabling Legislation for Fruit and Vegetable Marketing Orders: Evolution and Current Status* and *A Review of Federal Marketing Orders for Fruits, Vegetables, and Specialty Crops: Economic Efficiency and Welfare Implications* (see References). The status of marketing orders and our understanding of their effects have changed in several ways since the time that these two studies were written. However, it is unavoidable that much of the material in this report overlaps with that in earlier publications. Overlapping is due to the objectives of this report, such as documenting the current status and evolution of marketing orders.

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Glossary

Agricultural Marketing Agreement Act of 1937 (AMAA), as amended—Legislation authorizing Federal marketing agreements and orders for selected horticultural crops.

Competitive market—An industry with many small firms, no insurmountable barriers to firms to enter or exit the industry, small costs for firm entry or exit, and no one firm able to impact market prices by its actions.

Cost-saving input—A cost-saving input reduces the amount of at least one input needed to produce a unit of output.

Externality—An externality occurs when one person's (or group's) action benefits or costs another person (or group). The benefits or costs from the externality-generating activity are not priced in the marketplace and are often outside the control of the individual or individuals affected.

Federal marketing agreement—A marketing institution authorized by the Agricultural Marketing Agreement Act of 1937, as amended, which enables handlers to collectively regulate certain aspects of the marketing of produce in interstate and foreign commerce. Regulations are binding only on signatory handlers in the designated area.

Federal marketing order—A marketing institution authorized by the Agricultural Marketing Agreement Act of 1937, as amended, which enables growers to collectively regulate certain aspects of the marketing of produce in interstate and foreign commerce. Regulations approved by the Secretary of Agriculture are compulsory on all handlers in the designated area.

Free rider—A firm that benefits from a funded activity without contributing to its costs.

Grade and size requirements—Grade requirements (regulations) set the minimum quality produce must meet to be eligible for shipment to regulated markets (such as the fresh-use market). Size requirements usually set the minimum produce size eligible for shipment to regulated markets.

Grower price—The unit price of the commodity paid to growers by handlers.

Handler price—The unit price of the commodity paid to handlers by wholesalers and retailers.

Imperfect information—Information is imperfect when firms lack knowledge and an understanding of past, current, and future events which affect the market outcome.

Incomplete risk markets—Risk markets are said to be incomplete when there is an absence of a means for growers, marketers, and consumers to exchange (conditional) promises today about something that they will do at a future date. Absence of forward-pricing markets or crop insurance markets are examples.

Increasing economies of scale—The range of output where the average total cost of producing a unit of output, such as produce, research experiments, or advertising, is falling. Average total cost equals average variable cost plus average fixed cost.

Market failure—The inability of growers to provide certain goods, such as market information, generic advertising, and production and marketing research, because of free riders. Market failures include externalities, imperfect information, or incomplete risk markets. Such failures tend to elevate production and marketing costs and, thus, retail prices.

Market power—The potential for a firm or group of firms to affect market prices by controlling certain aspects of marketing, such as sales to a market, quality of produce sold, and funding for promotion and research.

Product diversion—Diverting sales of high-quality produce from the more price-responsive market (usually the fresh-use market) to the less price-responsive market (such as the processing-use market) with the objective of boosting weighted average farm prices and revenues.

Promotion, research, and package regulations—The set of regulations authorizing grower funding for generic advertising and promotion and production and marketing research and establishing package and container standards.

Retail price—The unit price for the commodity paid to retailers by consumers.

Risk aversion—Preference for a certain (monetary) payoff over a random (monetary) payoff with equal expected value.

Volume control—Regulations that can limit sales within a period of the marketing season or annual sales to some markets, such as the fresh-use, export, and processing-use markets.

Summary

Federal marketing orders for horticultural crops enable growers to collectively regulate certain marketing activities. Many marketing orders have regulations for funding promotion and research and establishing package, container, grade, and size requirements. The intent of these regulations is to increase sales by increasing buyer awareness of the product, developing more desirable products, and reducing marketing costs. A few marketing orders control the volume of produce entering certain markets and are intended to even out supplies and prices over time. These regulations can restrict sales of high-quality produce to the fresh-use market and boost farm prices for a given quantity. However, production increases stimulated by the higher prices cause those prices to fall.

The reason for having a Federal marketing order program and how it works are explained in this report. Marketing orders can be composed of many different kinds of regulations and can cover marketing activities (such as generic advertising, research, and promotion), grade and size requirements, and the control of the flow of farm produce to certain markets.

Marketing orders that authorize funding for generic advertising and commodity promotion programs (used when the commodity is highly homogeneous and produced by many growers) can expand demand by informing food processors, the food service industry, and consumers of new and existing products and uses and cultivating a more favorable image of the produce. Funding for research and standardization of packages and containers can reduce production and food distribution costs, resulting in lower retail prices and more sales. Demand expansion appeals to producers who can potentially sell more output at higher farm prices, but competition between products limits the potential increases in farm prices and sales.

Grade standards categorize produce by its quality, such as maturity, fermentation, decay or off-flavor, color, and shape. Size standards categorize produce by its size. Grade and size standards facilitate business transactions between handlers and retailers and consumers by conveying information about the attributes of the produce. Grade requirements can help keep immature, damaged, or defective produce off the market, while size requirements typically exclude small-sized produce. Such requirements reduce marketing costs if they prevent handlers from shipping produce that is likely to spoil or be unwanted by consumers.

Volume controls limit the produce that can be sold to regulated markets during a season or a period within the season. The regulated market is often the fresh-use market. Volume regulations can help stabilize prices and shipments, which can make planning easier for food distributors and retailers and reduce marketing costs. Risk-averse growers tend to produce more when prices are more predictable, which lowers prices and causes risk-averse marketers to handle more produce. Consumers may prefer stable prices and shipments over alternating periods of sparse and plentiful supplies.

Volume or, less frequently, grade or size regulations can restrict sales of high-quality produce to a more price-responsive market, such as the fresh-use market, causing some produce to be diverted to a less price-responsive market, such as the processing-use market. Product diversions tend to elevate weighted average farm prices and revenues. Higher prices stimulate production if the product diversion occurs over extended periods, which, in turn, lowers the prices. Growers' returns to limited factors of production, such as land, consequently are higher in the beginning, but as prices fall, so do returns. Product diversions cause a greater proportion of the crop to enter the low-valued processing-use market over time. Product diversions are controversial because consumers of fresh produce pay a higher price and purchase a smaller quantity while consumers of processed products pay a lower price and purchase a larger quantity. Consumers' total expenditures for the fresh produce and processed products are higher, however.

Product diversion over extended periods is unlikely to elevate farm prices permanently for most of the crops with a marketing order. Because most growers of crops with a marketing order compete with nonregulated domestic and foreign growers, consumers can usually substitute the marketing order commodity with a nonmarketing order commodity. Furthermore, growers expand output when the farm price is higher, causing the price to fall. Few marketing orders authorize volume regulations, which have the greatest ability to cause product diversions.

The net effect of volume regulations depends on their use. Stabilizing within-season and year-to-year prices and supplies can benefit growers, marketers, and consumers alike. Regulations used to permanently restrict sales to the fresh-use market would likely benefit only growers with land at the time the diversion program is initiated.

Federal Marketing Orders for Fruits, Vegetables, Nuts, and Specialty Crops

Nicholas J. Powers

Introduction

The annual farm value of fruit, vegetable, nut, and specialty crops regulated by Federal marketing orders and sold from marketing year 1985/86 to 1987/88 averaged nearly \$4.58 billion (table 1). Vegetables (including potatoes) had the highest average annual farm value at about \$1.64 billion; nuts, dried fruits, and spearmint oil totaled \$1.23 billion; citrus crops were next at \$933.1 million; while noncitrus crops totaled \$780.8 million. Fourteen Federal marketing orders regulated produce with an average annual farm value exceeding \$100 million while 29 marketing orders covered crops with an average annual value under \$100 million.

Marketing orders are concentrated in the West and Southeast. Marketing orders regulate 36 crops grown west of the Mississippi River, 8 crops grown east of the Mississippi River and south of Pennsylvania, and 2 crops grown east of the Mississippi River and north of Maryland.¹ Most geographic regions of the United States grow at least one fruit, vegetable, nut, or specialty crop whose marketing is regulated by a Federal marketing order.

Federal marketing orders are used extensively for fluid milk, but they are administered much differently than those for horticultural crops, so they are not examined in this report. State marketing orders, which typically authorize grade and size regulations and funding for generic advertising and commodity promotion, also are not examined. For example, the advertisements for California raisins are authorized under a State marketing order.

Federal marketing orders authorize the use of three broad categories of regulations for growers:

- Funding for commodity promotion and research and establishing package and container requirements,
- Grade and size requirements,
- Volume controls.

¹The cranberry marketing order covers production in 10 States from Massachusetts to Washington and, thus, is counted in two regions—west of the Mississippi River and east of the Mississippi River and north of Maryland.

Funding for commodity promotion is intended to expand demand by informing consumers and food processors of new and existing products and uses and by developing a positive reputation and goodwill for the commodity. Funding for research and establishing package and container requirements is intended to lower production and marketing costs, which can lower retail prices and increase sales. Grade and size requirements can restrict the marketing of undesirable produce, such as small-sized and immature produce. Volume controls regulate the quantity of produce entering the fresh-use market and sometimes the export and processing-use markets as well.

Why Do We Have Marketing Agreements and Orders?

Federal marketing orders were devised to help growers use collective action. Collective action consists of a group of growers contributing to the costs of their joint effort and sharing any benefits. Such action can be beneficial to growers, marketers, and consumers when there are market failures or economies of scale that individual growers cannot realize. Growers sometimes adopt collective action when the costs connected with forming the coalition are not insurmountable.

Collective action sometimes fails because of free ridership. A free-riding grower benefits disproportionately in relation to his contribution to the program costs (36).² Free ridership is likely to occur when farmers believe that they can benefit from the collective effort without contributing to the program costs. Before too long, so few growers are participating that the costs to the group exceed the benefits and the collective action collapses.

Farm prices were historically low during the Great Depression of the 1930's. Several marketing cooperatives attempted to elevate farm prices during the early 20th century by shipping only high-quality, fresh produce and limiting sales to a market, but were unsuccessful because nonparticipating growers would benefit without bearing any of the costs of withholding produce from the market. State

²Italicized numbers in parentheses refer to items cited in References at the end of this report.

Table 1—Annual farm value of fruit, vegetable, nut, and specialty crops¹

| Produce item | Marketing order crop | Domestic crop | Imports | Order crop as share of domestic crop and imports |
|--|-----------------------------|---------------------|-----------------------|---|
| | ----- Million dollars ----- | | | Percent |
| Citrus fruits: | | | | |
| Florida citrus | ² 279.5 | ³ 831.7 | ³ 5.3 | 34 |
| California-Arizona lemons | 186.4 | 201.4 | ⁴ 3.4 | 91 |
| Florida limes | 21.6 | 21.6 | ⁴ 4.9 | 82 |
| California-Arizona navel oranges | ⁵ 245.9 | ⁶ 298.1 | ⁷ 5.0 | 81 |
| California-Arizona Valencia oranges | 179.6 | ⁸ 211.6 | ⁷ 5.0 | 83 |
| Texas oranges and grapefruit | 20.1 | ⁹ 536.3 | ³ 5.3 | 4 |
| Deciduous fruits: | | | | |
| Washington apricots | 3.4 | 31.1 | ¹⁰ 17.5 | 7 |
| Florida avocados | 10.3 | 172.5 | ¹¹ 2.3 | 6 |
| Washington sweet cherries | 52.8 | 139.1 | ^{12,13} 6.0 | 36 |
| Cranberries (10 States) | 163.2 | 163.2 | ¹⁴ | 100 |
| California desert grapes | 79.4 | ¹⁵ 360.6 | ¹⁶ 207.2 | 14 |
| California Tokay grapes | 1.5 | ¹⁵ 360.6 | ¹⁶ 207.2 | less than 1 |
| California kiwifruit | 21.8 | 21.8 | 0 | 100 |
| California nectarines | 72.7 | 72.7 | 0 | 100 |
| California olives | 52.6 | 52.6 | ¹⁰ 114.8 | 31 |
| Hawaii papayas | 11.6 | 11.6 | ¹² 2.6 | 82 |
| Colorado peaches | 3.4 | ¹⁵ 230.5 | ¹⁰ 37.3 | 1 |
| Georgia peaches | 21.4 | ¹⁵ 230.5 | ¹⁰ 37.3 | 8 |
| Washington peaches | 8.6 | ¹⁵ 230.5 | ¹⁰ 37.3 | 3 |
| California pears, plums, peaches | ¹⁷ 167.4 | ¹⁸ 454.7 | ^{12,19} 75.8 | 32 |
| Pacific Coast winter pears | 86.3 | 131.7 | ¹⁰ 25.1 | 55 |
| Washington-Oregon Bartlett pears | 19.5 | 131.7 | ¹⁰ 25.1 | 12 |
| Washington-Oregon fresh prunes | 4.9 | ²⁰ 6.3 | ²¹ 10.1 | 30 |

— = Not available.

—Continued

¹Domestic-grown fresh vegetables are valued using the f.o.b. shipping point price. Domestic-grown nonvegetable produce is valued using the equivalent incoming packinghouse door price. The value of imports is based on foreign market value and excludes import duties, freight, insurance, or other expenses incurred in transporting the commodity to a U.S. port. The farm values of domestic-grown citrus fruits, vegetables, and potatoes are averages over the marketing seasons from 1985/86 to 1987/88. The farm values of domestic-grown deciduous fruits, dried fruits, nuts, and spearmint oil are averages over the marketing seasons from 1986 to 1988. The values of imports are averages over the fiscal years from 1985/86 to 1987/88.

²Includes grapefruit from the Indian River and Interior grapefruit programs, oranges, tangelos, tangerines, and temples entering fresh-use markets.

³Includes grapefruit, oranges, tangelos, tangerines, and temples entering fresh-use markets.

⁴From 1 to 15 percent of the value of imports are processed products.

⁵Includes some miscellaneous oranges entering fresh-use markets.

⁶The value of early, midseason, and navel oranges entering fresh-use markets during the winter season. These oranges compete mostly with California-Arizona navels.

⁷Imported fresh oranges, mandarins, tangerines, tangelos, and temples.

⁸All fresh Valencia oranges marketed from spring through the summer. These oranges compete mostly with fresh California-Arizona Valencias.

Table 1—Annual farm value of fruit, vegetable, nut, and specialty crops—Continued

| Produce item | Marketing order crop | Domestic crop | Imports | Order crop as share of domestic crop and imports |
|---------------------------------------|-----------------------------|---------------------|---------------------|---|
| | ----- Million dollars ----- | | | Percent |
| Dried fruits: | | | | |
| California dates | 17.1 | 17.1 | 4.7 | 78 |
| California prunes | 121.1 | 121.1 | 0 | 100 |
| California raisins | 274.3 | 274.3 | ¹⁰ 4.6 | 98 |
| Vegetables: | | | | |
| Florida celery | 44.6 | 213.5 | 3.0 | 21 |
| South Texas lettuce | 6.3 | 935.2 | ¹¹ 6.0 | 1 |
| Texas melons | 58.5 | — | ¹² 70.0 | — |
| Idaho-E. Oregon onions | 83.9 | 455.0 | ¹³ 59.8 | 16 |
| South Texas onions | 47.8 | 455.0 | ¹⁴ 59.8 | 9 |
| Vidalia onions | — | 455.0 | ¹⁵ 59.8 | — |
| Florida tomatoes | 502.9 | ¹⁶ 861.9 | ²² 221.2 | 46 |
| Rio Grande Valley (Texas) tomatoes | 6.4 | ¹⁵ 861.9 | ²² 221.2 | less than 1 |
| Potatoes: | | | | |
| Colorado | 61.7 | 1,712.9 | ²³ 83.4 | 3 |
| Idaho-E. Oregon | 371.9 | 1,712.9 | ²³ 83.4 | 21 |
| Maine | 109.0 | 1,712.9 | ²³ 83.4 | 6 |
| S. Oregon-N. California | 92.3 | 1,712.9 | ²³ 83.4 | 5 |
| Texas-New Mexico | — | 1,712.9 | ²³ 83.4 | — |
| Virginia-N. Carolina | 12.0 | 1,712.9 | ²³ 83.4 | 1 |
| Washington | 239.0 | 1,712.9 | ²³ 83.4 | 13 |
| Nuts: | | | | |
| California almonds | 569.9 | 569.9 | ²³ 3.7 | 99 |
| Oregon-Washington hazelnuts | 15.3 | 15.3 | ¹⁰ 7.0 | 69 |
| California walnuts | 209.5 | 209.5 | ¹⁰ 1.3 | 99 |
| Other specialty crops: | | | | |
| Spearmint oil | ²⁴ 21.4 | 25.8 | 0.6 | 81 |

⁹Grapefruits and early, midseason, and navel oranges entering fresh-use markets during the winter season, since they compete mostly with Texas citrus entering fresh-use markets.

¹⁰From 90 to 100 percent of the value of imports are processed products.

¹¹Less than 1 percent of the value of imports are processed products.

¹²From 50 to 90 percent of the value of imports are processed products.

¹³Fresh and processed cherry imports.

¹⁴Value is less than \$0.1 million.

¹⁵Produce to fresh use.

¹⁶Imported fresh produce.

¹⁷Covers the handling of fresh Bartlett pears, all plums, and fresh freestone peaches grown in the State of California.

¹⁸Fresh pears, all plums grown in the State of California, and fresh peaches.

¹⁹Includes all imported peaches, pears, and prunes, and fresh plums.

²⁰Produce to fresh use. Estimates include small quantities of prunes.

²¹Fresh plums.

²²Fresh and frozen tomato imports.

²³From 25 to 50 percent of the value of imports are processed products.

²⁴Spearmint oil order covers States of Washington, Idaho, Montana, Nevada, Utah, Oregon, and California, but the reported farm value is for produce grown in Idaho, Oregon, and Washington.

Sources: U.S. Dept. Agr., Nat. Agr. Stat. Serv.; and, U.S. Dept. Agr., Econ. Res. Serv., *Foreign Agricultural Trade of the United States: Fiscal Year 1988 Supplement*, May 1989.

marketing orders also failed to boost farm prices because growers in other States benefited without paying any program costs.

Congress responded to growers' requests for a means to find a solution to the free-rider problem by passing the Agricultural Marketing Agreement Act of 1937 (AMAA), as amended. The AMAA, as amended, is a reenactment of the Agricultural Adjustment Act (AAA) of 1935 which is an amended version of the original Agricultural Adjustment Act (AAA) of 1933 (29). The AMAA was motivated by several U.S. Supreme Court rulings which questioned the constitutionality of the AAA of 1933 and the AAA of 1935 (29).

The AMAA gave growers unprecedented market power by authorizing Federal marketing agreements and orders for specific fruit, vegetable, nut, and specialty crops. The legislation enabled growers to use collective action by making marketing order regulations compulsory on all handlers in the designated area. Marketing orders provide growers greater market power than agreements because the latter apply only to handlers who sign the agreement. In passing legislation authorizing Federal marketing agreements and orders, Congress intended growers to enhance their prices and revenues while also protecting consumer interests by assuring that farm prices did not rise too fast nor too high (for example, not above parity).³

Administering Marketing Agreements and Orders

The AMAA authorized Federal marketing agreements and orders for many fruit, vegetable, and tree nut crops, and their products, but there are exceptions and restrictions (see box "Marketing orders hold little promise..."). For instance, the only eligible canning and freezing crops covered by marketing agreements and orders are pears, olives, grapefruit, asparagus, cherries, cranberries, and apples grown in selected States. Apples grown for fresh use are eligible only in selected States. The list of horticultural crops eligible for marketing agreements and orders has been changed several times by amending the AMAA.

³The parity price of a produce item is the base farm price (the average farm price in the last 10 years divided by the index of prices received by farmers for all commodities during the last 10 years, 1910-14 = 100) times the current index of prices paid by farmers, 1910-14 = 100. Parity is an approximate measure of the farmers' returns (as measured by the index of prices received by farmers) in relation to the farmers' costs (as measured by the input price index). The basic notion of parity price is that the grower price needs to increase by about the same amount as the input prices in order for farmers to be as well off as they were in some base period. The definition of parity is severely limited because it does not account for the effect of technological change. For instance, while input prices have risen over time, less inputs are required to produce an equal amount of output. Therefore, the parity price index would tend to be biased upward (41).

The process for implementing marketing agreements and orders is specified in the AMAA. The process typically starts when a group of growers requests the Secretary of

Marketing Orders Hold Little Promise for Major Field Crops

Could marketing orders substitute for Federal price and income support programs covering the major field crops? The idea has considerable appeal because marketing orders involve no direct outlays from the U.S. Treasury. Other than some administrative expenses, direct outlays do not show up in the Federal budget, so marketing orders have been called "farm programs you don't see."

In most cases, it would be difficult to develop marketing orders that most growers would agree to because of the diverse production and marketing conditions for field crops. Most crops covered by a marketing order are grown by few producers within well-defined geographic areas and are marketed to a few markets. Field crop production occurs over wide areas of the country and involves many producers marketing crops to many markets.

In addition, growers can successfully boost farm prices by restricting sales of high-quality produce to a price-responsive market only when an industry can isolate its market from other suppliers. It is generally easier to isolate markets for horticultural crops than it is for the major field crops because of specialized production regions and short marketing seasons for many specialty crops.

Field crop producers in other countries compete directly with U.S. producers through world trade and any attempt to elevate the U.S. price of field crops would likely cause domestic field crop producers to lose export market shares. If the marketing orders enhanced U.S. prices for field crops above the world price, imports would enter the United States and cause domestic prices to fall.

Furthermore, higher farm prices would encourage domestic grain users to circumvent the marketing restrictions by producing their own grain and selling it in a different form. Feedlot operators, for example, could grow their own corn and market it through fed cattle.

Despite their potential benefits for producers of many horticultural crops, marketing orders do not appear to offer a workable alternative to the current price and income support programs, which can boost farm prices for major field crops.

Agriculture to establish a marketing order on their behalf.⁴ USDA is responsible for defining the marketing agreement and order area, which is the smallest area that can effectively carry out the declared policy of the AMAA. If the Secretary judges the marketing agreement/order to be feasible, a public hearing is held where interested parties debate the merits of the proposal. The Secretary, after reviewing the hearing records, decides whether the proposal would tend to support the declared policy of the AMAA and should go before a grower referendum.

A marketing order is issued by the Secretary of Agriculture after approval by at least two-thirds of the growers voting in the referendum or by growers producing at least two-thirds of the output (by volume) represented in the referendum. Approval by three-fourths of voting growers is required for orders covering western citrus crops.⁵ Growers vote on marketing orders, but authorized regulations are compulsory for all handlers shipping produce grown in the designated area. Orders for grapefruit, cherries, apples, or cranberries for canning and/or freezing must be favored by processors representing at least 50 percent of the volume frozen or canned.

Marketing agreements are voluntary, in contrast to marketing orders, and their regulations are binding only on signatory handlers. The Secretary issues a marketing agreement with an order if handlers who market at least half of the total volume of the crop covered by the order sign the agreement. Handlers who market at least 80 percent of the total volume of produce for the California-Arizona citrus crops must approve before the Secretary can issue a marketing agreement. Marketing agreements for grapefruit, cherries, apples, or cranberries for canning or freezing must be approved by processors who control at least half of the total volume of the produce frozen or canned. While a marketing agreement is not necessary for an order, it symbolizes handler support and industry unity for the regulations. The procedure for amending marketing agreements and orders parallels that for initiating one or the other.

Regulations authorized under a marketing agreement or order apply to the marketings of the crop in interstate and foreign commerce. If the Secretary of Agriculture determines that the handling of produce within a State directly burdens,

obstructs, or affects interstate commerce, a marketing agreement or order can include regulation of intrastate commerce.

USDA's guidelines on Federal marketing orders encourage periodic referendums for every order to determine the extent of grower support (46). The Secretary of Agriculture conducts such referendums for most, but not all, orders every 6 years. The order is continued if at least two-thirds of the voting growers or growers representing at least two-thirds of the production (three-fourths for California-Arizona citrus crops) approve. The Secretary decides whether to continue or suspend the order if the approval rate is between one-half and two-thirds.

The Secretary of Agriculture must terminate or suspend any marketing agreement or order that is found to obstruct or not effectuate the declared policy of the AMAA. However, if a suspension in the midst of a marketing season would create large grower and handler inequities, the Secretary may continue the order with all or some of its regulations. The Secretary must terminate a marketing agreement or order when at least half of the growers by number or volume of production favor termination.

Each marketing order has an administrative committee or board that recommends on the specific use of the regulations to the Secretary, attempts to maintain grower and handler equity, prepares and submits a marketing policy to the Secretary of Agriculture, administers and enforces regulations approved by the Secretary, and oversees the operation of the order. Equity refers to a state of outcomes between growers and handlers considered fair by most growers and handlers. The marketing policy is prepared near the beginning of the marketing season. This policy reviews the past, current, and expected economic conditions for the crop, which forms a basis for justifying the proposed regulations for marketing the new crop. Some administrative committees recommend regulations during the marketing season. The recommended regulations are reviewed by USDA staff and may be approved, approved subject to change, or rejected by the Secretary.⁶ Marketing order regulations become legally binding on all handlers in the designated area if, and when, approved. Administrative committees may revise the marketing policy as the season progresses to adapt to changes in supply and demand.

Administrative committees consist of between 4 and 54 growers, handlers, and often a consumer or public interest representative. Committee members are nominated by growers and handlers, but the Secretary of Agriculture must appoint all nominees before they serve. USDA's guidelines recommend a tenure of 6 years to encourage grower involve-

⁴The Agricultural Marketing Service (AMS) of the U.S. Department of Agriculture (USDA) maintains specialists in strategically located field offices to assist growers with defining their perceived marketing problems. Growers usually discuss the feasibility of a marketing order with AMS marketing specialists before a formal request is submitted to the Secretary of Agriculture.

⁵Marketing cooperatives can vote as a block. Block voting occurs when the marketing cooperative casts a single vote on behalf of its grower members. The cooperative's vote represents the majority view of its grower members, but it counts (for purposes of administering the marketing order) as if all growers voted in unison. USDA's guidelines on Federal marketing orders for horticultural crops, issued on January 25, 1982, do not encourage block voting because it can obscure the measure of grower support (46).

⁶Criteria to assist the USDA and administrative committees in evaluating and administering marketing policies and regulations are developed in (29).

ment, but not every marketing order limits tenure to 6 years (46).

Characteristics of the Commodities and Industries with Marketing Orders

The number, composition, and industry structure of the crops with marketing orders have changed drastically over the half-century since passage of the AMAA. This section highlights some of the recent significant changes in:

- Number of marketing orders and the characteristics of order crops.
- Industry structure of the crops with orders.
- Methods of pricing crops with orders.
- Share of the total crop supply regulated by orders.

Commodities

There are currently 46 Federal marketing orders and agreements, the same number as in 1970 (table 2). Marketing orders for Florida Indian River grapefruit, Florida interior grapefruit, California-Arizona desert grapefruit, tart cherries, and hops were terminated between 1980 and 1989, while

Table 2—Federal marketing agreements and orders in effect on January 1

| Commodity category | 1940 | 1950 | 1960 | 1970 | 1980 | 1989 |
|-------------------------------------|---------------|-----------|-----------|-----------|-----------|-----------|
| | <i>Number</i> | | | | | |
| Citrus fruits | 2 | 4 | 6 | 9 | 9 | 6 |
| Deciduous fruits | 5 | 8 | 10 | 16 | 16 | 17 |
| Dried fruits | 0 | 2 | 3 | 3 | 3 | 3 |
| Vegetables (excluding potatoes) | 7 | 2 | 6 | 6 | 7 | 8 |
| Potatoes | 1 | 9 | 8 | 7 | 6 | 7 |
| Nuts | 1 | 3 | 3 | 3 | 3 | 3 |
| Peanuts, hops, and spearment oil | 1 | 1 | 0 | 2 | 2 | 2 |
| Total | 17 | 29 | 36 | 46 | 46 | 46 |

Sources: U.S. Dept. Agr., Agr. Mkting. Serv.; National Commission on Food Marketing, *Federal and State Enabling Legislation for Fruit and Vegetable Marketing Orders: Evolution and Current Status*, Supp. 3 to Tech. Study No. 4, June 1966; Foytik, Jerry, "Marketing Agreements: Fruits and Vegetables" in Benedict, Murray R. and Oscar Stine, *The Agricultural Commodity Programs: Two Decades of Experience*, The Twentieth Century Fund, New York, 1956; and, Heifner, Richard, Walter Armbruster, Edward Jesse, Glenn Nelson, and Carl Shafer, *A Review of Federal Marketing Orders for Fruits, Vegetables, and Specialty Crops: Economic Efficiency and Welfare Implications*, AER-477, U.S. Dept. Agr., Agr. Mkting. Serv., Nov. 1981.

orders for California desert grapes, California kiwifruit, Vidalia onions, Texas-New Mexico potatoes, and spearmint oil were initiated. The composition of orders for the dried fruit and nut crops remained unchanged during the 1980's.

Except for tart cherries and hops, the regulations authorized by the recently terminated marketing orders were largely inactive and redundant to regulations of other, more active orders. Growers voted out the tart cherry order mainly because they perceived that it was not helping to alleviate low farm prices brought on by a supply glut. The Secretary terminated the hops order after a close grower vote outcome on whether to continue the order or not. Growers voted on whether to continue the hops order after the Secretary terminated the marketing allotment regulation because it did not effectuate the declared policy of the AMAA.

Twenty-nine of the present 45 marketing orders cover perennial crops and the other 16 orders regulate annual crops (table 3). Twenty-four of the marketing orders cover relatively perishable crops, while 21 of the orders regulate semi-perishable crops. Many perennial crops produce bountiful yields one year and scarce yields the next. The shelf life of perishable and semiperishable produce is very short—a few days to a couple of weeks. While techniques, such as application of gibberellic acid, can delay ripening, unpredictable weather affects the time when produce ripens. Cold storage can extend the length of time between harvesting and consuming many fresh produce items. The alternate bearing tendency and high perishability of many produce items mean that a well-coordinated marketing system capable of responding on short notice is required to assure that consumers receive wholesome, fresh produce.

Thirty-seven marketing orders regulate crops which are storable across seasons either in processed or unprocessed form. Sixteen regulate crops that are storable only within season. Orders authorizing volume control regulations are most often approved for storable crops.

Thirty-five existing marketing orders were initiated during the first 25 years of the enabling legislation. Eleven of the 35 marketing orders were initiated during the first 10 years (table 4).⁷ Seventeen of the 21 marketing orders authorizing at least one of the volume control regulations were initiated during the first 25 years of the AMAA.

Industry Structure

Most horticultural industries have become more concentrated over time as the number of growers and handlers has fallen.

⁷The 11 marketing orders include California-Arizona navel oranges and California-Arizona Valencia oranges which had a joint marketing order prior to 1953.

Grower Trends

Most marketing orders affect few growers because the orders cover limited geographic areas, such as a group of States, a State, or a portion of a State (table 5). One marketing order regulates peaches grown only in Mesa, Colorado. The cranberry order covers 10 States from Washington to Massachusetts and is the only order that approaches a national scope.

Most marketing orders cover a small geographic area because growers typically face more similar growing and marketing conditions than growers over a large, diverse area and, consequently, may have a more similar means of achieving common goals and objectives. Seventeen marketing orders have more than 1,000 growers, 15 have fewer than 250 growers, and 13 have between 250 and 1,000 growers.

Table 3—Production and storage characteristics of produce covered by Federal marketing orders

| Produce item | Production characteristics | | Storage characteristics | | | |
|-------------------------------------|----------------------------|-----------|-------------------------|-----------------|---------------|----------------|
| | Annual | Perennial | Perishable | Semi-perishable | Within season | Across season |
| <i>Category</i> | | | | | | |
| Citrus fruits: | | | | | | |
| California-Arizona navel oranges | | x | | x | x | ¹ x |
| California-Arizona Valencia oranges | | x | | x | x | ¹ x |
| California-Arizona lemons | | x | | x | x | ¹ x |
| Florida citrus | | x | | x | x | ¹ x |
| Florida limes | | x | | x | x | ¹ x |
| Texas oranges and grapefruit | | x | | x | x | ¹ x |
| Deciduous fruits: | | | | | | |
| California nectarines | | x | x | | | ¹ x |
| California peaches, pears, plums | | x | x | | | ¹ x |
| California kiwifruit | | x | x | | | |
| California desert grapes | | x | x | | | |
| California Tokay grapes | | x | x | | | |
| California olives | | x | x | | | ¹ x |
| Colorado peaches | | x | x | | | ¹ x |
| Florida avocados | | x | x | | | |
| Georgia peaches | | x | x | | | ¹ x |
| Hawaii papayas | | x | | x | x | ¹ x |
| Pacific Coast winter pears | | x | x | | | ¹ x |
| Washington apricots | | x | x | | | ¹ x |
| Washington sweet cherries | | x | x | | | ¹ x |
| Washington peaches | | x | x | | | ¹ x |
| Washington-Oregon Bartlett pears | | x | x | | | ¹ x |
| Washington-Oregon fresh prunes | | x | x | | | ¹ x |
| Cranberries (10 States) | | x | x | | | ¹ x |

—Continued

The quantity of produce regulated by most marketing orders has risen over time, but the number of growers has fallen. Costly mechanical harvesting and irrigation systems have encouraged larger farms and reduced grower numbers. Exceptions are Hawaiian papayas, where grower numbers have risen slightly over time, and Florida citrus, Pacific Coast winter pears, Washington sweet cherries, Washington-Oregon Bartlett pears, California raisins, Idaho-eastern Oregon onions, California almonds, and spear-

mint oil, where grower numbers have remained stable over time.

Handler Marketing Trends

Some growers integrated forward into handling fresh produce and processing over time. Only well-financed growers could enter processing because of the large investment in plant equipment needed for processing.

Table 3—Production and storage characteristics of produce covered by Federal marketing orders—Continued

| Produce item | Production characteristics | | Storage characteristics | | | |
|------------------------------------|----------------------------|-----------|-------------------------|-----------------|---------------|----------------|
| | Annual | Perennial | Perishable | Semi-perishable | Within season | Across season |
| Category | | | | | | |
| Dried fruits: | | | | | | |
| California dates | | x | x | | | |
| California prunes | | x | | | | x |
| California raisins | | x | | | | x |
| Vegetables: | | | | | | |
| Florida celery | x | | x | | | |
| Florida tomatoes | x | | x | | | ¹ x |
| Idaho-E. Oregon onions | x | | | x | x | ¹ x |
| Rio Grande Valley (Texas) tomatoes | x | | x | | | ¹ x |
| South Texas lettuce | x | | x | | | |
| South Texas onions | x | | x | | | |
| Texas melons | x | | x | | | |
| Vidalia onions | x | | | x | x | |
| Potatoes: | | | | | | |
| Colorado | x | | | x | x | ¹ x |
| Idaho-E. Oregon | x | | | x | x | ¹ x |
| Maine | x | | | x | x | ¹ x |
| S. Oregon-N. California | x | | | x | x | ¹ x |
| Texas-New Mexico | x | | | x | x | ¹ x |
| Virginia-N. Carolina | x | | | x | x | ¹ x |
| Washington | x | | | x | x | ¹ x |
| Nuts: | | | | | | |
| California almonds | | x | | | | x |
| California walnuts | | x | | | | x |
| Oregon-Washington hazelnuts | | x | | | | x |
| Other specialty crops: | | | | | | |
| Spearmint oil (six western States) | x | | x | | | x |

¹Only storable across seasons in processed form.

Some crops with marketing orders are marketed by cooperatives, particularly in the West where the cooperative movement was strong during the early 20th century.⁸ For example, cooperatives handle significant shares of the western-grown citrus crops (navel and Valencia oranges and lemons), noncitrus crops (cranberries, prunes, and raisins), and nut crops (almonds, hazelnuts, and walnuts). Cooperatives are much less significant for the other order crops.

Handlers directly market some fresh produce either to wholesalers located near major metropolitan areas or to retailers. The share of fresh produce going to wholesalers has remained constant during the past 20 years. Processors directly market most products to retailers and major institutional buyers.

⁸Primary and/or secondary data on market shares of cooperatives and independent handlers are unavailable. Information on handler trends is based on conversations with knowledgeable industry personnel.

The number of handlers in many marketing orders has fallen over time, despite production expansion, because of increasing economies of scale in marketing and transportation. Large investments in marketing and transportation equipment encouraged larger marketing firms and reduced handler numbers. Exceptions are orders for:

- Colorado potatoes and California almonds where the number of handlers has risen slightly over time.
- California-Arizona lemons, Florida limes, Florida avocados, Georgia peaches, Washington apricots, Washington sweet cherries, Idaho-eastern Oregon onions, Colorado potatoes, and Oregon-Washington hazelnuts, where the number of handlers has remained stable over time.

Most marketing orders have fewer than 100 handlers, and the handler market is becoming more concentrated as handler numbers fall over time (table 6). Because of greater

Table 4—Year Federal marketing order initiated

| Produce item | Year |
|-------------------------------------|------|
| Citrus fruits: | |
| California-Arizona navel oranges | 1953 |
| California-Arizona Valencia oranges | 1954 |
| California-Arizona lemons | 1941 |
| Florida citrus | 1939 |
| Florida limes | 1955 |
| Texas oranges and grapefruit | 1960 |
| Deciduous fruits: | |
| California nectarines | 1958 |
| California pears, plums, peaches | 1939 |
| California kiwifruit | 1984 |
| California desert grapes | 1980 |
| California Tokay grapes | 1940 |
| California olives | 1965 |
| Colorado peaches | 1956 |
| Florida avocados | 1954 |
| Georgia peaches | 1942 |
| Hawaii papayas | 1971 |
| Pacific Coast winter pears | 1939 |
| Washington apricots | 1957 |
| Washington sweet cherries | 1957 |
| Washington peaches | 1960 |
| Washington-Oregon Bartlett pears | 1965 |
| Washington-Oregon fresh prunes | 1960 |
| Cranberries (10 States) | 1960 |
| Dried fruits: | |
| California dates | 1955 |
| California prunes | 1949 |
| California raisins | 1949 |

| Produce item | Year |
|------------------------------------|------|
| Vegetables: | |
| Florida celery | 1965 |
| Florida tomatoes | 1955 |
| Idaho-E. Oregon onions | 1957 |
| Rio Grande Valley (Texas) tomatoes | 1959 |
| South Texas lettuce | 1960 |
| South Texas onions | 1961 |
| Texas melons | 1979 |
| Vidalia onions | 1988 |
| Potatoes: | |
| Colorado | 1941 |
| Idaho-E. Oregon | 1941 |
| Maine | 1954 |
| S. Oregon-N. California | 1942 |
| Texas-New Mexico | 1988 |
| Virginia-N. Carolina | 1948 |
| Washington | 1949 |
| Nuts: | |
| California almonds | 1950 |
| California walnuts | 1948 |
| Oregon-Washington hazelnuts | 1949 |
| Other specialty crops: | |
| Spearmint oil (six western States) | 1980 |

Sources: U.S. Dept. Agr., Agr. Mkting. Serv.; and, Heifner, Richard, Walter Armbruster, Edward Jesse, Glenn Nelson, and Carl Shafer, *A Review of Federal Marketing Orders for Fruits, Vegetables, and Specialty Crops: Economic Efficiency and Welfare Implications*, AER-477, U.S. Dept. Agr., Agr. Mkting. Serv., Nov. 1981.

economies of scale, there are fewer handlers of processing-use crops than of fresh-use crops. For example, while the volume of (mostly fresh-use) California-Arizona navel orange and Valencia orange crops is only about a third the volume of the (mostly processing-use) Florida citrus crop, both industries have about the same number of handlers.

Methods of Pricing

The first place of sale for most fresh produce covered with a marketing order, such as citrus, noncitrus, and vegetables, is at the shipping point or wholesale market. Pricing of fresh produce at the shipping point occurs through: (1) negotiations between a handler and wholesaler or retailer, usually

Table 5—Commercial growers by Federal marketing order¹

| Produce item | 1965 | 1970 | 1975 | 1980 | 1985 | 1988 |
|---|--------|--------|--------|--------|--------|--------|
| <i>Number</i> | | | | | | |
| Citrus fruits: | | | | | | |
| California-Arizona navel oranges ² | 4,200 | 4,600 | 4,750 | 4,059 | 3,855 | 4,065 |
| California-Arizona Valencia oranges | 5,100 | 4,600 | 4,400 | 3,830 | 3,543 | 3,500 |
| California-Arizona lemons | 4,000 | 2,350 | 2,000 | 2,400 | 2,900 | 2,500 |
| Florida citrus ³ | 15,000 | 15,600 | 15,600 | 14,000 | 15,000 | 17,000 |
| Florida limes | 500 | 500 | 100 | 160 | 291 | 230 |
| Texas oranges and grapefruit | 4,000 | 4,000 | 2,800 | 2,900 | 2,000 | 2,500 |
| Deciduous fruits: | | | | | | |
| California nectarines | 1,250 | 1,250 | 700 | 700 | 815 | 740 |
| California peaches, pears, plums | — | — | — | — | 2,800 | 2,030 |
| California peaches | 2,500 | 2,500 | 900 | — | — | 840 |
| California pears | 3,450 | 3,450 | 540 | — | — | 300 |
| California plums | 2,270 | 2,270 | 1,700 | 2,650 | — | 1,500 |
| California kiwifruit | — | — | — | — | 1,200 | 1,200 |
| California desert grapes | — | — | — | — | 88 | 88 |
| California Tokay grapes | 1,200 | 1,200 | 1,200 | 400 | 390 | 390 |
| California olives | 1,500 | 1,500 | 1,500 | 1,300 | 1,375 | 1,375 |
| Colorado peaches | 800 | 800 | 300 | 200 | 245 | 260 |
| Florida avocados | 600 | 600 | 150 | 190 | 432 | 330 |
| Georgia peaches | 350 | 350 | 120 | 100 | 150 | 265 |
| Hawaii papayas | — | 165 | 180 | 180 | 200 | 200 |
| Pacific Coast winter pears | 1,800 | 1,800 | 1,800 | 1,500 | 1,817 | 1,817 |
| Washington apricots | 1,000 | 1,000 | 250 | 210 | 190 | 190 |
| Washington sweet cherries | 1,000 | 1,000 | 1,300 | 1,200 | 1,115 | 1,200 |
| Washington peaches | 1,500 | 1,500 | 500 | 450 | 390 | 390 |
| Washington-Oregon Bartlett pears | 2,000 | 2,000 | 2,500 | 2,000 | 1,900 | 1,900 |
| Washington-Oregon fresh prunes | 1,000 | 1,000 | 500 | 450 | 375 | 375 |
| Cranberries (10 States) | 1,300 | 1,300 | 1,000 | 900 | 900 | 950 |

— = Not available.

—Continued

¹These estimates are based upon judgments made each year by Agricultural Marketing Service personnel, since data on numbers of growers are not collected on a systematic basis for all of the marketing orders. These estimates should not be used to draw exact inferences about individual marketing orders because they are subject to some error. The data are useful for showing general trends.

by telephone; or (2) a broker who negotiates for handlers and wholesalers or retailers, usually by telephone, and charges either the handler or buyer a service fee. National and major regional retailers often have buyers located near major producing areas who directly purchase produce from handlers. Most sales of fresh produce at the handler market are sold free-on-board, which means that the handler is responsible for loading the containers into the cargo hold of a carrier and the buyer pays hauling charges. The buyer typically arranges for a transportation carrier to haul the produce.

Handlers and buyers negotiate price, volume of sale, price discounts for volume purchases, quality of produce, promotional credit, credit for produce delivered damaged, and time and date of loading. Buyers sometimes have the option of refusing delivery when the produce arrives if it is of lower quality than negotiated. The buyer usually pays the handler or broker upon delivery and inspection of the fresh produce.

Pricing of fresh produce at the wholesale market occurs through: (1) face-to-face negotiations between wholesalers

Table 5—Commercial growers by Federal marketing order—Continued

| Produce item | 1965 | 1970 | 1975 | 1980 | 1985 | 1988 |
|---------------------------------------|---------------|--------------------|-------|-------|-------|-------|
| | <i>Number</i> | | | | | |
| Dried fruits: | | | | | | |
| California dates | 235 | 160 | 175 | 143 | 135 | 150 |
| California prunes | 4,300 | 4,500 | 2,600 | 2,000 | 2,000 | 1,200 |
| California raisins | 5,000 | 4,600 | 4,500 | 4,800 | 5,000 | 5,000 |
| Vegetables: | | | | | | |
| Florida celery | — | 49 | 42 | 26 | 11 | 13 |
| Florida tomatoes | 1,360 | 435 | 100 | 185 | 170 | 180 |
| Idaho-E. Oregon onions | 300 | 295 | 400 | 250 | 337 | 360 |
| Rio Grande Valley (Texas) tomatoes | 1,200 | 300 | 70 | 40 | 25 | 30 |
| South Texas lettuce | 146 | 146 | 50 | 47 | 33 | 33 |
| South Texas onions | 600 | 342 | 195 | 180 | 160 | 160 |
| Texas melons | — | — | — | 76 | 79 | 72 |
| Vidalia onions | — | — | — | — | — | 260 |
| Potatoes: | | | | | | |
| Colorado | 1,455 | 812 | 280 | 395 | 330 | 290 |
| Idaho-E. Oregon | 5,624 | 3,817 | 1,900 | 2,000 | 3,793 | 3,100 |
| Maine | 3,003 | 2,148 | 900 | 1,281 | 750 | — |
| S. Oregon-N. California | 1,003 | 850 | 750 | 464 | 469 | 470 |
| Texas-New Mexico | — | — | — | — | — | 110 |
| Virginia-N. Carolina | 3,955 | 1,400 | 300 | 300 | 169 | 150 |
| Washington | 850 | 704 | 425 | 400 | 361 | 360 |
| Nuts: | | | | | | |
| California almonds | 8,000 | 6,954 | 6,500 | 7,091 | 7,500 | 7,500 |
| California walnuts ⁴ | 10,000 | 9,000 | 7,900 | 9,000 | 8,000 | — |
| Oregon-Washington hazelnuts | 2,600 | ⁵ 1,390 | 1,062 | 1,081 | 1,063 | 1,300 |
| Other specialty crops: | | | | | | |
| Spearmint oil (six western States) | — | — | — | 250 | 253 | 253 |

²Includes growers of miscellaneous oranges in California and Arizona.

³Includes commercial growers of oranges, grapefruit in the Indian River and Interior programs, tangerines, and tangelos.

⁴Included Oregon and Washington State before 1976 and after 1985

⁵Only includes growers with at least 50 trees.

Sources: U.S. Dept. Agr., Agr. Mkting. Serv.; and, Heifner, Richard, Walter Armbruster, Edward Jesse, Glenn Nelson, and Carl Shafer, *A Review of Federal Marketing Orders for Fruits, Vegetables, and Specialty Crops: Economic Efficiency and Welfare Implications*, AER-477, U.S. Dept. Agr., Agr. Mkting. Serv., Nov. 1981.

and buyers, including retailers, at central markets; or (2) consignment sales at central markets. Central markets are typically located near major metropolitan areas. Retailers and restaurants are significant buyers at wholesale markets. Major retailers who directly purchase fresh produce from handlers also buy in the wholesale market when the quantity demanded by consumers exceeds the quantity they directly purchased from handlers. Fresh produce sales at the wholesale market are usually sold with payment within 30 days. Buyers and sellers negotiate price, quantity of produce,

quality of produce, and sometimes terms of payment. Wholesalers usually pay the hauling cost of delivering produce to the wholesale market and buyers pay the hauling cost of delivering the produce to their place of business.

Growers of fresh produce typically negotiate a contract with a handler who markets their crop. The handler is often responsible for harvesting, cleaning, inspecting, grading, packaging, and selling the produce. The grower receives from the handler a price derived from the handler price. It

Table 6—Commercial handlers by Federal marketing order¹

| Produce item | 1965 | 1970 | 1975 | 1980 | 1985 | 1988 |
|---|------|-------|------|------|------|------|
| <i>Number</i> | | | | | | |
| Citrus fruits: | | | | | | |
| California-Arizona navel oranges ¹ | 147 | 145 | 118 | 111 | 119 | 125 |
| California-Arizona Valencia oranges | 152 | 148 | 130 | 119 | 115 | 115 |
| California-Arizona lemons | 66 | 63 | 65 | 67 | — | 85 |
| Florida citrus ² | 157 | 144 | 142 | 135 | 107 | 99 |
| Florida limes | 17 | 18 | 24 | 28 | 20 | 18 |
| Texas oranges and grapefruit | 21 | 21 | 23 | 25 | 0 | 13 |
| Deciduous fruits: | | | | | | |
| California nectarines | — | 275 | 226 | 240 | 247 | 245 |
| California peaches, pears, plums | — | 1,115 | 745 | — | 770 | 755 |
| California peaches | — | 442 | 242 | — | 334 | 320 |
| California pears | — | 73 | 61 | — | 43 | 45 |
| California plums | — | 600 | 442 | — | 393 | 390 |
| California kiwifruit | — | — | — | — | 67 | 145 |
| California desert grapes | — | — | — | — | 22 | 25 |
| California Tokay grapes | 35 | 23 | 22 | 21 | 14 | 9 |
| California olives | 29 | 12 | 10 | 7 | 8 | 8 |
| Colorado peaches | 43 | 95 | 63 | 72 | 28 | 53 |
| Florida avocados | 35 | 40 | 36 | 39 | 28 | 36 |
| Georgia peaches | 36 | 42 | 34 | 32 | 30 | 30 |
| Hawaii papayas | — | 86 | 174 | 73 | 100 | 122 |
| Pacific Coast winter pears | 95 | 107 | 103 | 83 | 94 | 91 |
| Washington apricots | 25 | 61 | 82 | 63 | 57 | 58 |
| Washington sweet cherries | 22 | 68 | 142 | 69 | 64 | 65 |
| Washington peaches | 118 | 124 | 139 | 112 | 89 | 85 |
| Washington-Oregon Bartlett pears | 95 | 107 | 95 | 70 | 89 | 72 |
| Washington-Oregon fresh prunes | 40 | 45 | 51 | 35 | 38 | 41 |
| Cranberries (10 States) | — | 35 | 20 | 25 | — | 31 |

—Continued

approximately equals the handler price less the handler's charge for marketing services.

The first place of sale for most processed commodities with a marketing order, such as the nuts, dry fruits, and spearmint oil, is at the packinghouse door. Pricing of processed products in the wholesale market occurs through: (1) telephone trading between a handler/processor and a food manufacturer, institutional buyer, wholesaler, or retailer; or (2) face-to-face negotiations between a handler/processor and a food

manufacturer, institutional buyer, wholesaler, or retailer. There are no futures market contracts traded on an organized exchange for fresh and processed crops with a marketing order. Buyers and sellers of processed products negotiate price, quantity of sale, quality, volume discounts, and terms of payment.

Growers usually harvest nut crops, dry fruits, or distill the spearmint into oil and deliver the processed commodity to a handler who grades, packs, and markets the processed

Table 6—Commercial handlers by Federal marketing order—Continued

| Produce item | 1965 | 1970 | 1975 | 1980 | 1985 | 1988 |
|---------------------------------------|------|------|------|------|------|------|
| <i>Number</i> | | | | | | |
| Dried fruits: | | | | | | |
| California dates | 20 | 12 | 17 | 17 | 22 | 18 |
| California prunes | 17 | 14 | 12 | 13 | 16 | 16 |
| California raisins | 23 | 18 | 18 | 20 | 23 | 23 |
| Vegetables: | | | | | | |
| Florida celery | 16 | 15 | 15 | 12 | 7 | 7 |
| Florida tomatoes | 125 | 110 | 92 | 97 | 103 | 100 |
| Idaho-E. Oregon onions | 25 | 23 | 27 | 23 | 23 | 30 |
| Rio Grande Valley (Texas) tomatoes | — | — | — | — | — | 2 |
| South Texas lettuce | 20 | 23 | 13 | 10 | 4 | 10 |
| South Texas onions | 68 | 52 | 49 | 45 | 42 | 40 |
| Texas melons | — | — | — | — | 35 | 35 |
| Vidalia onions | — | — | — | — | — | 160 |
| Potatoes: | | | | | | |
| Colorado | 62 | 71 | 63 | 76 | — | 120 |
| Idaho-E. Oregon | 163 | 115 | 93 | 117 | 106 | 70 |
| Maine | — | — | — | — | — | — |
| S. Oregon-N. California | 183 | 121 | 64 | 44 | — | 45 |
| Texas-New Mexico | — | — | — | — | — | 30 |
| Virginia-N. Carolina | 300 | 270 | 250 | 200 | 70 | 60 |
| Washington | 113 | 66 | 63 | 68 | 53 | 50 |
| Nuts: | | | | | | |
| California almonds | 12 | 17 | 17 | 20 | 50 | 115 |
| California walnuts ³ | 50 | 48 | 39 | 27 | 46 | 60 |
| Oregon-Washington hazelnuts | 10 | 9 | 8 | 9 | 14 | 26 |
| Other specialty crops: | | | | | | |
| Spearmint oil (six western States) | — | — | — | 10 | 10 | 9 |

— = Not available.

¹Includes commercial handlers of miscellaneous oranges in California and Arizona.

²Includes commercial handlers of oranges, grapefruit, tangerines, and tangelos. Includes Indian River and Interior grapefruit programs.

³Included Oregon and Washington State before 1976.

Sources: U.S. Dept. Agr., Agr. Mkting. Serv.; and, Heifner, Richard, Walter Armbruster, Edward Jesse, Glenn Nelson, and Carl Shafer, *A Review of Federal Marketing Orders for Fruits, Vegetables, and Specialty Crops: Economic Efficiency and Welfare Implications*, AER-477, U.S. Dept. Agr., Agr. Mkting. Serv., Nov. 1981.

commodity to food processors, wholesalers, or retailers. The handler typically pays the grower when the commodity is delivered.

Marketing Order Coverage of the Crop Supply

Marketing orders authorizing grade, size, or volume control regulations can sometimes divert sales of high-quality produce to a regulated market, such as the fresh-use, to a non-regulated market, such as the processing-use. The price for produce entering the fresh-use market rises, but the price for produce entering the processing-use market may fall. The weighted average farm price, however, is higher if the fresh-use market is more price responsive to sales than is the processing-use market. Such product diversion is more likely to boost the weighted average farm price when the market is isolated from competitors, supply is less responsive to a higher weighted average farm price, and consumers cannot easily substitute the high-quality produce with other produce items. The ability of a product diversion to permanently boost farm prices is probably limited for most crops with a marketing order because most growers of the crops with a marketing order compete with nonregulated domestic and foreign growers, consumers can substitute the marketing order commodity with a nonmarketing order commodity, and growers can expand output when the farm price is higher, which causes prices to fall.

One indicator of the degree to which a crop with an order is isolated from competitors is the share of the annual farm value of the domestic crop and imports covered by the order. This share lies between zero and one. A zero signifies a crop whose marketing is completely nonregulated, whereas a one signifies a crop whose marketing is completely regulated. As the share approaches one, marketing order coverage of the domestic crop and imports is more complete and product diversions are more likely to boost the weighted average farm prices.

Marketing orders are arranged according to the completeness of their coverage of the crop supply (column 5, table 1). Marketing orders covering 90 percent or more of the corresponding annual farm value of the domestic crop and imports are:

- California-Arizona lemons,
- Cranberries,
- California kiwifruit,
- California nectarines,
- California prunes,

- California raisins,
- California almonds,
- California walnuts.

Each of these eight marketing orders authorizes a grade, size, or volume control regulation.

Marketing orders covering more than 75 but less than 90 percent of the corresponding annual farm value of the domestic crop and imports are:

- Florida limes,
- California-Arizona navel oranges,
- California-Arizona Valencia oranges,
- Hawaiian papayas,
- California dates,
- Spearmint oil.

Each of these six marketing orders authorizes a grade, size, or volume control regulation. Orders for the crops in the second category are less likely to lift farm prices through product diversions as compared with the orders in the first category, because the orders in the second category cover a smaller share of the crop supply.

Marketing orders covering between 33 and 75 percent of the corresponding annual farm value of the domestic crop and imports are:

- Florida citrus,
- Washington sweet cherries,
- Pacific Coast winter pears,
- Florida tomatoes,
- Oregon-Washington hazelnuts.

Each of these five marketing orders are less likely to boost farm prices through product diversion as compared with the crops in the first two categories because of greater supply competition from nonregulated domestic and foreign growers.

The remaining 26 marketing orders cover less than 33 percent of the corresponding annual farm value of the domestic

crop and imports. These marketing orders are unlikely to raise farm prices through product diversion because of intense supply competition from nonregulated domestic and foreign growers.

The Regulations

The AMAA, as amended, authorizes three broad categories of regulations (table 7). Thirty-six of the 45 marketing orders authorize collecting funds for promotion and research and 28 include establishing package and container regulations. Forty-two authorize grade or size regulations. Twenty-one authorize volume control regulations. All marketing orders authorize more than one regulation. The number of authorized regulations varies from a low of two for Georgia peaches to a high of eight for Florida celery.

Why Do We Have Regulations?

Economic theory suggests that efficient use of resources results from free markets unless there are market failures or market imperfections, such as few firms. Efficient can mean that competitive growers, processors, and marketers produce the largest amount of output demanded by consumers, which maximizes firms profits given the prevailing market prices and production and marketing technology (32). This definition of efficiency says nothing about equity, such as the composition and distribution of the output among members of society. Three kinds of market failures pertaining to marketing—externalities, imperfect information, and incomplete risk markets—can lead to inefficiencies (15, 39).

Externalities occur when an individual's action is beneficial or costly to other individuals. The benefit or cost from the externality-generating activity is not priced in the marketplace and is outside of the control of the individuals affected. Externalities create inefficiencies because the grower and or handler often does not internalize the costs on others (or benefits on others) of his action and, consequently, he produces too much (or too little) of the good or service. Most marketing externalities are costly and their consequences include higher costs for consumers and lower revenues for other growers and handlers. For example, a costly externality is created when a handler, encouraged by high farm prices in the early months of the season, ships outwardly attractive but immature produce. The consequences include disappointment and higher costs for consumers who purchase the undesirable produce. Any resulting loss of consumer confidence and goodwill probably depresses farm prices and lowers revenues for growers and handlers who ship high-quality produce.

Information is imperfect when growers, handlers, and consumers lack relevant knowledge about past, present, and

future events. This condition can lead some growers and handlers to occasionally supply misleading information to consumers. For example, when consumers cannot accurately assess nonobservable product attributes (internal quality) prior to purchase, some growers and handlers are tempted to supply misleading information, such as about the maturity or flavor. Such information can lead to inefficiencies because consumers are sometimes fooled into purchasing produce of inferior quality. A related problem is that some large national and regional retailers, who possess superior information because of their geographical dispersion and financial support, may sometimes use that information advantage to bargain for a lower price from growers and handlers. Asymmetric information is said to occur when one individual possesses more information than another. Another problem is that individual growers and handlers have a tendency to produce too little information. Some types of information are largely public goods and paying handlers have troubles capturing all information benefits. Paying handlers contribute to the cost of collecting information, whereas nonpaying handlers do not contribute to these costs. Goods for which rationing is infeasible (because it is too costly to exclude the good from nonpaying handlers) and undesirable (because of efficiency reasons and also because one handler's consumption of the good does not detract from the amount that others can consume of the good) are called public goods (39). Public goods are generally undersupplied in the free market, which results in inefficiencies. Examples of goods with some characteristics of a public good include market information, generic advertising and promotion, and production, marketing, and product research. Excluding the information from nonpaying handlers is not easy and often infeasible. Too little information, misleading information, or asymmetric information can result in markets operating less efficiently.

Risk markets are said to be incomplete when there is an absence of means for growers, marketers, and consumers to exchange (conditional) promises today about something that they will do at a future date. Risk markets are intended to transfer risks between firms. Absence of forward-pricing markets and crop insurance markets are examples of incomplete risk markets. These markets are sometimes absent when the sunk costs of establishing the market are high and few firms are willing to contribute collectively to the cost (free-rider problem). Noncontributing firms believe that other firms will bear the sunk costs and the noncontributors can enjoy the benefits of the market.

Examples of market failures often overlap. For instance, the externality generated from shipments of immature produce can also be explained by the fact that consumers possess imperfect information about product quality. The need for risk-transferring markets arises because firms possess imperfect information.

Table 7—Authorized regulations of Federal marketing agreements and orders¹

| Produce item | Promotion, research, and package | | | Grade and size | | Volume controls | | | | |
|---|-------------------------------------|---|---|----------------|---|-----------------|---|---|---|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| <i>Category</i> | | | | | | | | | | |
| Citrus fruits: | | | | | | | | | | |
| California-Arizona navel oranges ² | x | x | | | x | | x | | | |
| California-Arizona Valencia oranges ² | x | x | | | x | | x | | | |
| California-Arizona lemons ² | x | x | | | x | | x | | | |
| Florida citrus ³ | | | x | x | x | x | | | | |
| Florida limes | x | x | x | x | x | x | x | | | |
| Texas oranges and grapefruit ⁴ | x | x | x | x | x | | | | | |
| Deciduous fruits: | | | | | | | | | | |
| California nectarines | x | x | x | x | x | | | | | |
| California pears, plums, peaches | x | x | x | x | x | | | | | |
| California kiwifruit | | | x | x | x | | | | | |
| California desert grapes | x | x | x | x | x | x | | | | |
| California Tokay grapes | x | x | x | x | x | x | x | | | |
| California olives | x | x | | x | x | | | | | |
| Colorado peaches | x | x | | x | x | | | | | |
| Florida avocados | x | x | x | x | x | x | | | | |
| Georgia peaches | | | | x | x | | | | | |
| Hawaii papayas | x | x | x | x | x | | | | | |
| Pacific Coast winter pears | x | x | | x | x | | | | | |
| Washington apricots | x | x | x | x | x | | | | | |
| Washington sweet cherries | x | x | x | x | x | | | | | |
| Washington peaches | x | x | x | x | x | | | | | |
| Washington-Oregon Bartlett pears | x | x | x | x | x | | | | | |
| Washington-Oregon fresh prunes | x | x | x | x | x | | | | | |
| Cranberries (10 States) ⁵ | | | | | | | | x | | x |

1. Generic advertising and promotion.
2. Production and marketing research.
3. Package and container requirements.
4. Grade requirements.
5. Size requirements.
6. Shipping holidays.
7. Prorates.
8. Market allocation.
9. Reserve pool.
10. Marketing allotment.

—Continued

Table 7—Authorized regulations of Federal marketing agreements and orders—Continued

| Produce item | Promotion, research, and package | | | Grade and size | | Volume controls | | | | |
|--|-------------------------------------|---|---|----------------|---|-----------------|---|---|---|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| <i>Category</i> | | | | | | | | | | |
| Dried fruits: | | | | | | | | | | |
| California dates | x | x | x | x | x | | | x | | |
| California prunes | x | x | x | x | x | | | | x | |
| California raisins | x | x | | x | x | | | x | x | |
| Vegetables: | | | | | | | | | | |
| Florida celery | x | x | x | x | x | x | x | | | x |
| Florida tomatoes | x | x | x | x | x | | | | | |
| Idaho-E. Oregon onions | x | x | x | x | x | x | | | | |
| Rio Grande Valley (Texas) tomatoes ² | x | x | x | x | x | | | | | |
| South Texas lettuce | x | x | x | x | x | x | x | | | |
| South Texas onions | x | x | x | x | x | x | | | | |
| Texas melons | x | x | x | x | x | | | | | |
| Vidalia onions | x | x | | | | | | | | |
| Potatoes: | | | | | | | | | | |
| Colorado | x | x | x | x | x | | | | | |
| Idaho-E. Oregon | | | x | x | x | | | | | |
| Maine | | | x | x | x | | | | | |
| S. Oregon- N. California | x | x | | x | x | | | | | |
| Texas-New Mexico ² | x | x | x | x | x | | | | | |
| Virginia-N. Carolina | | | | x | x | | | | | |
| Washington | | | | x | x | | | | | |
| Nuts: | | | | | | | | | | |
| California almonds | x | x | | x | | | | x | x | |
| California walnuts | x | x | | x | x | | | x | x | |
| Oregon-Washington hazelnuts | | | | x | x | | | x | | |
| Peanuts ^{6,7} | | | | x | x | | | | | |
| Other specialty crops: | | | | | | | | | | |
| Spearmint oil (six western States) ⁸ | x | x | | | | | | | x | x |

¹As of September 1, 1989.

²Marketing order only; no marketing agreement.

³Covers oranges, grapefruit, tangerines, and tangelos entering fresh-use markets. Includes Indian River and Interior grapefruit programs.

⁴Restricting handler deliveries is specifically prohibited.

⁵Grade and size requirements apply only to portion of crop placed into the reserve pool.

⁶Marketing agreement only; no marketing order. Covers States of Alabama, Florida, Georgia, Mississippi, South Carolina, Arizona, Arkansas, California, Louisiana, New Mexico, Oklahoma, Texas, Missouri, North Carolina, Tennessee, and Virginia.

⁷Contains a provision authorizing the inspection for aflatoxin damaged peanuts.

⁸Covers States of Washington, Idaho, Montana, Nevada, Utah, Oregon, and California.

Sources: U.S. Dept. Agr., Agr. Mktg. Serv.; and, General Services Administration, Office of the Federal Register National Archives and Records Service, *Code of Federal Regulations*.

Growers and handlers sometimes attempt to remedy market failures through collective action. For example, growers and handlers collectively have a financial incentive to establish arrangements for internalizing the cost of an externality, generating information, and developing risk-transferring markets. Eliminating market failures can potentially improve efficiency.⁹

Collective action often fails because of the free-rider problem (39). The benefits of removing market failures accrue to all growers and handlers—participants and nonparticipants alike—while the costs from organizing the collective action are borne only by participants. The elimination of many market failures has characteristics of a public good. That is, it is generally too costly to exclude noncontributors and noncontributors' consumption of the good does not affect contributors' consumption of the good. Each grower and handler has an incentive to not participate (free ride) and enjoy the benefits of the other growers' and handlers' effort. The demise of the collective action is inevitable as more growers and handlers free ride.

One way to eliminate free riders and, hence, market failures, is to make handler participation in collective action compulsory. Mandatory handler participation requires public intervention usually in the form of regulations, such as marketing orders (39). Mandatory participation transfers some of the individual grower and handler marketing decisions to the group with the expectation that collectively growers and handlers are "better-off." While most growers must expect to be "better-off" with the marketing order, this does not mean that all growers do. Grower support for a marketing order is seldom unanimous. Collective action can also create a new set of market failures which can potentially make some growers and handlers "worse-off."

Modifications in the regulations of a proposed marketing order can help persuade a majority of growers to vote favorably. Hallagan, in an examination of the now suspended hops marketing order, found that changes in the proposed marketing order may have sufficiently altered the amount and expected distribution of benefits and costs between growers to persuade enough growers to vote favorably (18).

It is not feasible to eliminate all market failures, nor is it efficient when the costs of regulating exceed the generated benefits (39). Program costs include organizing grower groups, administering programs, collecting fees, and monitoring and enforcing regulations. Program benefits include higher farm

prices, lower production and marketing cost through greater efficiency, and lower retail prices.

Some economists believe that policymakers often initiate regulation programs on grounds of removing market failures, but regulated growers eventually use the regulations to extract benefits from consumers (28, 30, 35). Such transfers are more likely to occur when the potential benefits per grower resulting from the regulations are relatively high and potential costs per consumer are inconsequential. In a study of California-Arizona navel oranges, the annual cost to consumers of the prorate regulation program varied from 0.7 cent per capita during a small crop year to 7 cents per capita during a large crop year, while the annual average gain to growers varied from \$478 per grower in a small crop year to \$4,912 per grower in a large crop year (31). Consumers permit such transfers because, individually, they have little incentive to form a coalition and intervene to offset the influence regulated growers may exert on persons in positions of public authority. Economists embracing this view argue that the rationale for regulations extends beyond efficiency, encompassing allocation and distribution of wealth as well.

Promotion, Research, and Package Regulations

Funding for promotion is intended to expand demand. Funding for research and establishing package standards is intended to lower production and marketing costs, resulting in a lower retail price and an increase in the quantity demanded by consumers. Although demand expansion appeals to growers who can potentially sell more output at higher prices, competition between industries can limit the potential increases in farm prices and sales.

Generic Advertising and Promotion

Generic advertising and commodity promotion involve growers directing messages to food processors, wholesalers, retailers, food services, and consumers with the purpose of increasing total sales of a commodity. Brand advertising and promotion, in contrast with generic advertising and promotion, are aimed at increasing the demand for the product of a single firm. Generic advertising and promotion are used when the final product is derived from a homogeneous commodity produced by many growers. Thirty-six of the marketing orders authorize generic advertising and promotion programs (table 7).

Generic advertising includes radio, television, newspaper, magazine, and billboard messages, while commodity promotion includes sponsoring buyer seminars and product booths at trade shows, providing point of purchase pamphlets and posters, and making direct contact to existing and potential buyers. The objective of generic advertising and promotion

⁹The elimination of one market failure without the removal of all others does not necessarily improve efficiency because market prices remain distorted when there is at least one market failure. Removing some market failures, but not all, can potentially lead to less efficient market outcomes (24).

is to convince potential buyers to purchase the commodity and to persuade existing buyers to continue buying the commodity and to purchase more of it. Advertising supplies information on the uses and availability of new and existing products, nutritional value, price, terms and places of sale, and product guarantees (see box "How does advertising work...") (10). Generic advertising and promotion, like all types of advertising, have informative and entertaining elements which are generally inseparable (29).

Collective funding of generic advertising and promotion overcomes problems of economies of scale and free riders and helps assure that handlers share the costs in proportion to any benefits. The minimum investment required for advertising and promotion to be effective in developing and expanding regional, national, and overseas markets is generally too large for most individual handlers. Handlers must have the financial resources to wait before realizing any

How Does Advertising Work and Why Does It Work?

How do successful, informative advertising and promotion work? First, buyers must become cognizant of the advertisement before they listen to its content. Entertaining elements (noninformative aspects) of advertising can help increase potential and existing buyers' awareness of the advertisement. Second, after listening to the message, consumers become curious about the product. The message helps potential buyers decide whether to inquire further about the product, purchase the product, or do nothing. The message reminds existing buyers of the reasons why they purchase the product.

Why do informative advertising and promotion work? Three views offer explanations. One, advertising can help consumers discover their true preferences for products (relative level of satisfaction derived from products). If the advertising changes consumer preferences favorably toward the product, consumers usually purchase more of the advertised product and less of others. Two, it can change consumers' terms of acquiring the product by reducing consumers' search cost (11, 38). Search cost is the value of time and resources buyers expend searching for information on prices, product quality, safety, place of sale, and terms of sale prior to making purchases. Lower search cost for marketers and consumers lowers the cost of completing business transactions, which helps to lower prices. Three, advertising can help consumers purchase products with desirable attributes. Product attributes are real or fancied. Real product attributes include objective characteristics of the product, such as nutritional value. Fancied product attributes include subjective characteristics of the product, such as social fashion (37).

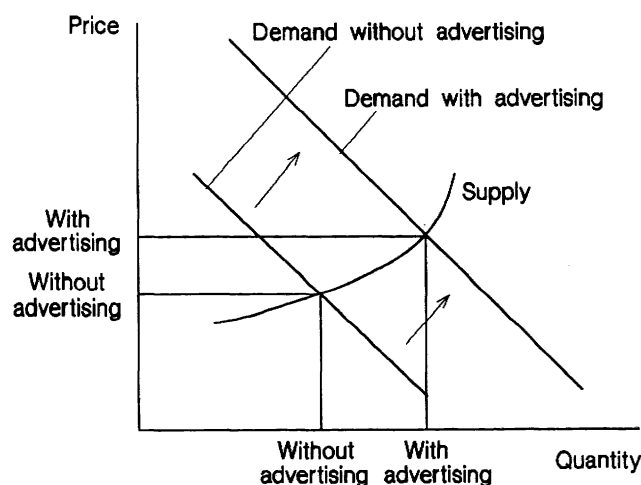
return on their investment, because generic advertising gradually expands demand (2).

Consumers actively and passively acquire information on products, and their knowledge of products changes over time as some old information is eventually forgotten or replaced with new information. Consumers tend to adjust their purchase patterns only gradually in response to advertising, thus the effect of advertising on demand is spread over several periods after the advertising initially appears. The forgetting of information means that an advertising campaign needs to be continued to permanently enhance demand.

The administrative committee proposes an annual advertising budget and the USDA reviews and, subject to any changes, approves or denies the request. All production sold from the area covered with a marketing order is assessed a proportionate share of the advertising and promotion expenses. The assessment is levied on handlers who may deduct all or part of it from growers' net return or pass all or some of the assessment onto marketers. Handlers would probably pass some of the benefits from the generic advertising and promotion back to growers.

When generic advertising and promotion successfully persuade consumers to purchase more of the commodity, demand shifts upward and the price rises (fig. 1). Buyers benefit from advertising when it broadens product awareness and reduces the cost of searching for desired products and, thus, indirectly increases buyers' satisfaction. Handlers and growers benefit when the higher revenues from advertising

Figure 1
Effects of generic advertising



exceed the costs of the effort. Handlers and growers may sometimes advertise to offset a potential sales loss from a competitor's advertising. The economic benefits to consumers and handlers and growers when handlers and growers compete in marketing with advertising are ambiguous.

Per capita total food consumption is relatively constant, and advertising a given food product generally reduces demand for close substitutes. The potential effectiveness of advertising in increasing demand for each product probably declines as more products are advertised. Nevertheless, advertising can potentially increase demand for the advertised commodity or it may also effectively slow or stop a declining trend in demand. Handlers and growers may benefit further if advertising persuades consumers to purchase higher valued products.

Handler and grower inequities may result from permitting handlers to advertise and promote brand name commodities and receive credit for their brand advertising against their share of the industry's cost for generic advertising. The messages of generic advertising and promotion carry information about a generic (industry) product, whereas brand advertising conveys information mostly about a brand (firm) product. Generic advertising expands the total demand for the commodity (brand and nonbrand products), but brand advertising likely expands the demand for the target product more than, and perhaps at the expense of, the nonbrand products. The equity issue is whether to permit handlers who brand advertise and promote to receive credit for their expenses against their share of the industry's expense for generic advertising and promotion. Opponents claim that brand advertisers benefit from the generic advertising program without paying. Brand advertisers argue that their advertising expands total demand and benefits the industry as well as themselves. In real world markets, handlers who brand advertise often use brand advertising to develop new markets rather than to expand or increase their share of existing markets. Brand advertising used to develop new markets is unlikely to reduce demand for nonbrand products in existing markets. The marketing orders for California almonds, hazelnuts, and olives permit handlers who advertise their own brands to obtain at least partial credit for their expenses against the assessments of the marketing order, but the program is currently in effect only for almonds.

Several empirical studies suggest that generic advertising can temporarily boost sales. Clarke found in his literature review that about 90 percent of the cumulative effect of advertising on sales of established, frequently purchased, low-priced products occurs within 3 to 9 months of the advertisement (8). Kinnuncan and Forker reported that generic advertising enhanced sales of fluid milk in New York City for 6 months after the advertisement appeared (23). Blaylock and Blisard found that generic advertising

increased sales of natural cheese during the month the advertisements appeared while brand advertising did not affect sales of natural cheese (2). Blaylock and Blisard also reported that brand and generic advertising, when combined together in a statistical analysis, increased sales of processed cheese for 12 months (2). Farris and Albion, in a survey of empirical studies, found mixed results of the effect of advertising on price (13).

Production, Marketing, and Product Research

Industry-sponsored research seeks to solve production, marketing, and product problems, such as high rates of shrinkage and spoilage, inferior quality, or poor consumer acceptance. Such problems create inefficiencies and limit growers' competitiveness.

Collective funding of research overcomes problems of economies of scale and free riders and helps assure that handlers share costs in proportion to benefits. Most individual handlers cannot afford the minimum outlays required to conduct effective research. Handlers who can afford such research frequently undersupply funding because research has characteristics of a public good and paying handlers cannot fully isolate the benefits exclusively for themselves. Nonpaying handlers benefit from research when it enters the public domain.¹⁰ Thirty-four of the marketing orders authorize production and marketing research.

Research is funded much the same way as generic advertising and promotion with pro rata assessments on handlers based on the quantity of produce shipped. The level of assessment is proposed by the administrative committee and is subject to the review and approval of the USDA. Handlers may deduct all or part of the assessment from growers' net returns or pass all or some of the assessment onto marketers. Handlers, therefore, pay for research in proportion to the benefits that they receive. Competing handlers would likely pass some of the benefits from research onto growers in the form of greater sales and higher farm prices.

Growers become more competitive with domestic and overseas rivals when research lowers per-unit production cost, thereby helping growers maintain or increase their market share. Research can increase productivity (or lower cost) by developing new practices and technologies that enable growers to either produce the same output with fewer inputs or produce more output with the same inputs. Examples of production research include developing more efficient irrigation

¹⁰ Access to basic innovations, such as a new tomato variety, can be protected with a patent. However, most applied research applies existing methods and technology to solve problems and, access to the results cannot be restricted by a patent. For example, applied innovations are easily transferred and diffused to nonexperimenting handlers/farmers who directly observe field experiments.

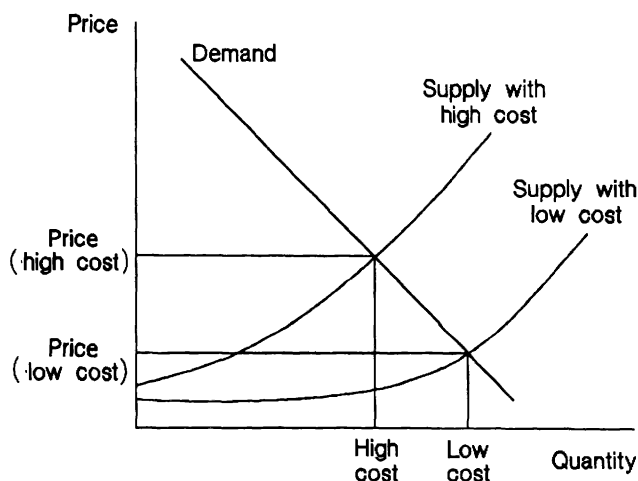
systems and ways to limit produce damage from natural pests and low and high temperatures.

The effects of production research are illustrated in figure 2. Growers adopt more efficient practices and the supply curve shifts downward because per-unit costs of production are lower. Despite lower farm prices, growers expand production (since costs are lower) while consumers can buy more produce at lower retail prices. Grower revenues probably fall since the farm price usually falls by proportionately more than the increase in production. Grower profits are higher, however, if production costs are reduced by more than the decline in revenue.

Some production research, such as developing drought-resistant produce varieties, can help reduce the chance of low per-acre crop yields, making growers' down-side income risk lower. Risk-averse growers with less income risk generally produce more output. Consumers can then purchase more produce at lower retail prices.

More efficient production technologies can create inequities between growers by changing relative wealths. Such inequities sometimes arise when a new technology is better suited for certain climatic areas, soil types, or sizes of farms than for others. For example, costly technology is more often adopted by large-sized, well-financed growers than by small-sized growers. New production technology can also displace laborers, particularly when the technology is labor saving and capital using.

Figure 2
Effects of production research



Marketing research can reduce marketing costs by developing new packaging and container materials, which reduce bruising and spoilage of produce and improve the quality of produce reaching consumers. Other examples of such research include studying new handling processes, packaging materials, and containers which require fewer and less costly marketing inputs.

When competitive handlers, wholesalers, and retailers adopt lower cost marketing practices, they are expected eventually to pass the cost savings on to consumers and growers (3, 6, 17, 44). Higher farm prices stimulate increased production. Consumers can then purchase more produce at lower retail prices.

Research for developing new varieties with characteristics considered more desirable by consumers can help growers overcome problems of poor consumer acceptance. Consumers can also benefit by extending product choices. The introduction of a new produce variety can potentially cause an upward shift in demand. Growers expand output in response to higher farm prices and consumers purchase more of the desirable commodity at higher retail prices. Handlers and growers benefit when higher revenues resulting from the new varieties exceed the research costs.

Container and Package Standards

Twenty-eight marketing orders authorize container and package requirements. These regulations fix the size, capacity, weight, dimensions, or pack of the container, or containers, that handlers must use in the packaging, sale, shipment, or handling of produce. These regulations can lower the cost of transacting business by providing greater uniformity. Industries without a large and dominant handler capable of setting the industry standard sometimes have a proliferation of containers and packages.

Standardization of containers and packages can lower marketing costs in several ways. The costs of completing business transactions are lower because handlers, wholesalers, and retailers can more effectively negotiate prices and quantities over long distances. Transportation costs are also lower, because haulers can more efficiently load and arrange produce in the cargo hold of trucks and rail cars. Retailing costs are lower since less equipment is needed.

These requirements also regulate the materials used to make containers and packages. Materials must be sturdy enough to protect the produce from bruising and scarring while it is in transit. Damaged or spoiled produce adds to distribution costs since retailers either sell damaged produce at a discount or dispose of it.

The potential effects of these standards on prices and sales are similar to the effects of marketing research. Cost savings resulting from standardization of containers and packages translate into higher farm prices and lower retail prices if marketers are competitive. Despite smaller marketing margins, marketers' revenues may rise because consumers buy more produce at the lower retail price. Marketers' revenues are higher if the percentage increase in sales exceeds the percentage decrease in the marketing margin.

Grade and Size Regulations

Grade standards categorize produce by attributes observable by consumers prior to purchase, such as certain defects, color, and shape, and by attributes nonobservable by consumers prior to purchase, such as maturity, fermentation, decay, disease, or off-flavor. Size standards categorize produce by its size. Grade and size standards can convey information about the quality of the produce to marketers and consumers, so buyers are not required to travel and see the produce prior to purchase. Such information can lower the costs of completing transactions for marketers and consumers (38).

Grade requirements (regulations) prohibit handlers from shipping substandard-quality produce while size requirements typically prohibit handlers from shipping small-sized produce. Minimum size and grade requirements are enforced by authorizing inspection services, which require inspectors to visually observe the external appearance of the produce and to cut open the produce and check that the internal quality of the produce meets minimum grade requirements. These requirements can restrict sales of potentially unprofitable produce or produce likely to shrink excessively, and enhance efficiency. However, these requirements can also restrict sales of fresh-quality produce to a market, and that restriction may boost farm prices (4, 5, 27). Size requirements, the most frequently authorized regulation, are authorized in 41 marketing orders. Thirty-nine of the marketing orders authorize grade requirements, making grade the second most often authorized regulation.

The economic rationale for grade requirements covering the external attributes (observable by consumers prior to purchase) of produce and size requirements is to help prevent handlers from shipping produce that sells for less than the variable costs of marketing. A few who have incomplete price information sometimes ship such produce. Improving the dissemination of market prices for different grades and sizes of produce to handlers could also help eliminate this problem. Misshapen, damaged, or off-color produce is sometimes unprofitable to ship because it is either likely to spoil while in transit, shrink excessively, or be unwanted by consumers. Marketing and retailing costs should be lower when handlers do not ship such produce.

The economic rationale for grade requirements covering the internal attributes (unobservable by consumers prior to purchase) of produce is to help build and maintain a reputation with consumers for consistently supplying produce of high quality. A few handlers tempted by high prices early in the season sometimes ship outwardly attractive but immature or off-flavor produce. Consumers who cannot observe the internal quality of produce prior to purchase are disappointed by the undesirable taste of the produce. Any resulting loss of consumer goodwill and confidence weakens demand for the produce. Retailers usually discount the selling price to compensate consumers for the uneven internal quality of the produce. Retail buyers who can identify only the shipping area often become suspect of all produce from the area and discount the price they are willing to pay, purchase less produce from the area, or purchase produce elsewhere. Sometimes it is difficult for buyers to identify the handlers shipping immature produce or mixing inferior-quality produce in shipments since produce is commingled and often it is not branded. Branding produce is not economically feasible for small-sized and medium-sized handlers who cannot justify the moderate fixed costs. The industry reputation tends to suffer when a few handlers commingle low-quality produce with high-quality produce. Growers and handlers who ship produce of high quality suffer the costs of this externality, namely lower farm prices and revenues.

Grade requirements are typically used to cultivate a positive image of a consistent and reliable supplier of high-quality produce. Economists believe this goodwill- and confidence-building activity strengthens demand and boosts farm prices (26). Grade and size standards also provide a tool whereby handlers can stratify consumer demand and expand overall demand by more closely matching supplies with consumer-desired choices of produce. Handlers and growers can profit by continuing to add new categories of grade and size standards if the gains in lower transaction costs for marketers and consumers exceed the costs in establishing the new category. Grade and size standards can create more categories of produce than recognized by marketers and consumers. For example, Sun, in her study of Florida green tomatoes, found that the grade and size standards draw finer distinctions than do consumers (40). This finding suggests that too many specific grade and size standards can be superfluous and may only hike marketing costs. Careful use of grade requirements and standards has been credited with the growth in output and consumer acceptance of California nectarines (29). Melon growers and shippers in Texas report that before their marketing order became effective, shipments of overripe melons with short shelf life weakened the market for all melons within a day's truck drive from the point of production (29).

Grade and size requirements are controversial because they can sometimes restrict sales of fresh-quality produce to the

regulated market (such as fresh use) and divert shipments to nonregulated markets (such as processing). Handlers and growers may be tempted to impose such requirements because revenues are higher if the regulated market is more price responsive to fewer sales than the nonregulated market is to more sales. Retail prices for produce and consumer expenditures in the regulated market are higher, while those in the nonregulated market usually are lower. However, a higher farm price does not translate into a proportionately higher retail price since marketing services constitute a large part of the retail price. Restricting sales to the regulated market tends to limit consumer choices. For example, high-quality produce that are misshapen and off-color may be the only fresh produce affordable to lower income consumers. Restricting sales of this produce can mean that some lower income consumers cannot afford any.

Section 8e of the AMAA authorizes that whenever a marketing order regulates the grade and size of certain horticultural crops, imports of the same commodities are prohibited unless they meet the grade and size requirements of the order or comparable restrictions (29). Grade and size requirements for marketing order crops currently apply to the imports of 18 commodities. This section of the AMAA prevents imports of low-quality commodities which could damage domestic handler and grower efforts to develop the domestic market by creating a positive image of the commodity. Rigorous grade and size requirements could potentially prohibit some high-quality imports into the United States and lift domestic farm prices.

Volume Controls

Volume controls include shipping holidays, prorates, market allocations, reserve pools, and marketing allotments. These regulations establish a ceiling on the maximum quantity of produce that can enter certain markets during the season or a period within the season.

Shipping Holidays

Shipping holidays prohibit handlers from sending produce to the market during brief periods, such as a few days or a week. These holidays are intended to prevent sharp declines in farm prices when there is a temporary oversupply. For example, some handlers, who have imperfect information on shortrun price expectations, sometimes ship large volumes of produce and are disappointed by the unexpected low prices. Improving the accuracy and dissemination of information can help handlers boost revenues by better planning of shipping schedules. Shipping holidays prevent this type of problem by allowing time for the market to realign a temporary market supply and demand imbalance. The shipping holiday is the mildest form of volume control.

The Florida citrus industry sometimes uses shipping holidays to clear markets of unsold fresh produce following the pre-Christmas volume buildup. This shipping holiday is sometimes controversial. Some Florida growers feel that the shipping holidays prevent sharp declines in prices when consumer demand for fresh citrus falls off sharply for a week or so after Christmas and retailers often hold some leftover inventory. Other growers feel that competitors in Texas and California-Arizona increase their shipments during the shipping holidays, resulting in lost marketing opportunities for Florida growers.

Shipping holidays are unlikely to greatly affect the season's price and sales to markets because they are used infrequently and are only temporary. Higher farm prices cannot be sustained since the holidays do not restrict sales for a substantial portion of the marketing season.

Four of the nine marketing orders authorizing shipping holidays are for highly perishable crops (California desert grapes and Tokay grapes, Florida celery, and south Texas lettuce) and the remaining five are for slightly less perishable crops (Florida citrus, limes, and avocados, Idaho-eastern Oregon onions, and south Texas onions).

Prorates

Prorates regulate shipments to the markets over longer periods than shipping holidays (see box, "What do prorates mean..."). Prorates set an upper limit on weekly shipments to a market, or markets, that handlers can ship on behalf of the contracted growers. Prorates seldom, in practice, completely prevent handlers from sending produce to a market as do shipping holidays. Prorates usually regulate weekly shipments to the higher priced fresh-use market. Each handler's share of the industry prorated is proportional to the share of the industry production controlled by the handler. This criterion does not encompass quality considerations. Growers and handlers with low-quality produce have equal access to the regulated market as do growers with high-quality produce.

Prorate is intended to provide some of the benefits of absent risk-transferring markets, such as forward-pricing markets, by stabilizing intraseasonal prices and shipments. Opportunities for growers to reduce price risks by forward pricing are very limited or absent for most of the commodities covered by marketing orders authorizing prorated regulations. Forward pricing involves entering a contract that fixes prices for a product to be delivered in the future. The seller agrees to ship a fixed amount of the product of specified grade and size to the buyer on a set future date at an agreed-upon price. To be most successful, forward pricing must be accompanied by futures trading on organized exchanges, which brings large numbers of traders together and allows price risks to be

What Do Prorates Mean for the California Navel Orange Farmer?

To better understand how prorates operate, consider the following example:

Farmer Peterson grows navel oranges in California's San Joaquin Valley and contracts with a packer-handler, Oranges, Inc., to harvest, grade, pack, and market the fruit. Oranges, Inc., deducts a handling charge and pays Peterson what is left of the proceeds.

Navel oranges are excellent eating, so Oranges, Inc., likes to sell most of the crop in the fresh market, bringing the highest return. Small, scarred, or misshapen oranges that do not meet fresh-use market standards are sold to a processor for making juice concentrate. Since navels do not make good juice oranges, processors pay a lower price for them.

Peterson's farm is in California and Oranges, Inc., must abide by the regulations of the Federal marketing order for California-Arizona navel oranges. Under the marketing order, the Navel Orange Administrative Committee (Committee), subject to the USDA's review and approval, determines the maximum weekly quantities that may be sold in the fresh-use market (the industry's prorate) during a portion of the season. The Committee takes into account the supply and expected demand for oranges, and sets the quantity of prorate to avoid market gluts and a sharp decline in farm prices. Initial prorates are estimated at the beginning of the season, but can be adjusted upward or downward as the season progresses. Oranges, Inc.'s share of the industry's prorate is proportional to the share of total industry production which it has under contract with growers like Peterson.

Oranges, Inc., may sell as many of its oranges in the fresh-use market as its share of the prorate permits. The remainder may be held for later sale, exported, sold for processing, or donated to charitable organizations. Peterson receives an average of Oranges, Inc.'s return from all sales.

Experience has demonstrated that a glut of oranges depresses the fresh price more than an equal amount of oranges, if diverted, reduces the processing price. If the marketing order diverts some fresh-quality oranges to processing (most likely during large crop years), Peterson's returns rise. Consumers pay higher prices for fewer fresh oranges during large crop years if diversion to processing happens.

However, there may be some benefits to consumers that offset the costs of higher prices during large crop years. If prorates help even out supplies over the season, resulting in smaller week-to-week swings in prices and quantities marketed, marketing costs are probably lower and, eventually, retail prices are lower if marketers are competitive.

The higher average prices spur Peterson to eventually produce more oranges. In a small crop year, consumers find that they would likely have more fresh oranges at a lower price than otherwise.

shifted to speculators. Fruit and vegetable products generally lack the homogeneity or volume needed to attract large numbers of speculative traders required for futures trading to succeed. Growers of many horticultural crops can purchase crop insurance. Crop insurance, however, is meant to protect growers from low income when crop yields are low. Crop insurance does little, if anything, to protect growers from low prices when crop yields are large. Risk-transferring markets are absent when the sunk costs of establishing them are high, buyers or sellers are likely to default on the contract and recourse is infeasible, costs of completing the transaction are high, or there are few buyers and sellers (thin market). Marketers and growers who desire to avoid down-side price risk, which can lead to bankruptcy, generally benefit from transferring some risks. Economists tend to believe that many growers are risk averse and act to avoid down-side price risk. Establishing some, but not all, absent risk-trans-

ferring markets, however, does not necessarily improve marketing efficiency (19). Whether prorate regulation can provide greater within-season stability of prices and shipments than the free market, or other market institutions, is debatable and controversial and probably deserves further empirical work.¹¹

Two empirical studies investigated whether the level of weekly shipments and prices were less uniform without pro-

¹¹ Greater stability refers to less risky prices and shipments and/or less variation in observed prices and shipments. Prices and shipments are risky because, before the outcomes of unpredictable events are known, prices and shipments can take on one of many values for given supply and demand conditions. Weather and labor strikes are examples of unpredictable events which impact prices and shipments. Observed prices and shipments are variable because they change over time in response to unpredictable events and changing supply and demand conditions.

rate regulation by comparing the variability of weekly shipments and prices (as measured by the variance and coefficient of variation) during a period of prorated suspension with a comparable period with prorated regulation. Powers and others, in a study of California-Arizona navel oranges, reported mixed results (31). Carman and Pick, in a study of California-Arizona lemons, found fresh domestic shipments and handler prices were more stable during the prorated period compared with several seasons when prorated was not used (7). In another study, Jesse and Johnson reported mixed findings when comparing the variability of annual prices for each marketing order commodity with the corresponding nonmarketing order commodity (or a close substitute) (21).

Can Prorates Stabilize Within-Season Prices and Shipments?

Instability of within-season prices and shipments is important because it affects prices, shipments, and costs. Risk-averse growers produce less when exposed to price risk. Risk-averse handlers, processors, and inventory holders handle fewer shipments or take larger markups. Retailers experience greater difficulties planning business operations, such as in-store promotions and labor schedules. Food processors can incur more one-time labor, maintenance, and administrative costs since when supplies are erratic, plant capacity changes more frequently. Cost savings from stabilizing within-season prices and shipments shrink marketing margins and translate into higher farm prices and lower retail prices if marketers are competitive.

Smoothing out within-season shipments can help stabilize within-season prices (25). Shipments can be smoothed out by temporarily withholding produce from the market during weeks of abundant supplies and releasing produce during weeks of scarce supplies. Prorate regulations can temporarily withhold produce from the regulated market by establishing a small enough prorated quantity. Semiperishable crops, such as oranges, lemons, and grapefruit, can be stored on the tree for short periods of time without significantly affecting their quality. Reducing within-season shipment variability would stabilize within-season prices more when demand is more steeply downward sloping (more price inelastic). The aggregate farm-level demand for most produce items is fairly price inelastic. However, the farm-level demand for many crops with marketing orders covering a relatively small portion of the total crop supply is less price inelastic because there are many close substitutes.

Stabilizing within-season shipments does not necessarily stabilize prices when demand shifts erratically. Within-season demand shifts destabilize within-season prices for a given volume of shipments. The seasonal shifts in the market demand can be caused by holidays, such as Thanksgiving and Christmas, seasonal supplies of substitute crops, or an

external shock to the general economy (economic recession or recovery). In this case, within-season prices can be made more stable only by making within-season shipments less stable. Prorate regulation can do little to stabilize within-season prices if within-season shipments of substitute crops are erratic and the marketing order covers only a small portion of the total crop supply.

Product Diversion Can Boost Farm Prices. Not only can prorated regulation shift sales within the season, but it can restrict annual sales to the regulated market (such as fresh use) and effectively divert sales to nonregulated markets (such as processing). Such product diversion would likely occur if prorated regulation is used throughout most of the marketing season and the quantity prorated is consistently less than the amount handlers would ship otherwise.

If prorated regulations had restricted sales to the higher priced fresh-use market, handlers would be expected to compete for greater shares of the fresh-use market when the regulations were suspended. A test of this hypothesis using data from California-Arizona navel oranges indicated that there were few differences in the share of shipments going to fresh-use and export markets across handlers of similar size, location, and organization structure following the midseason 1984/85 prorated suspension as compared with an earlier period with prorated regulation (31). The suspension was for a partial season, and handler marketing shares might change if the suspension were continued for an extended period.

Product diversion can boost the weighted farm price and grower revenues if the processing-use market is less price sensitive to greater sales than the fresh-use market for a given supply (9). Appendix I describes in more technical terms the implications of using prorated regulation to restrict sales to the fresh-use market. The box on prorates boosting farm prices summarizes the empirical findings from case studies of the effects of using prorated regulation to divert sales. Such diversions are controversial because more output enters the lower valued processing-use market and less output enters the higher valued fresh-use market.

The consequences of a product diversion continued over extended periods depend on the size of the production response. The higher shortrun weighted farm price stimulates longrun production which causes prices to fall. The larger the production response, the more likely is the longrun price to return to its free-market level. Production response is larger when inputs, such as water, fertilizer, labor, and arable land suitable for growing the crop, are available. Land can limit production growth for those horticultural crops restricted to a narrow geographic area endowed with specific climatic and soil conditions. Land may come from reducing plantings of competing crops.

Empirical Findings Suggest Prorates Can Boost Farm Prices

The simulated results from two studies suggested that the marketing orders for California-Arizona navel and Valencia oranges had restricted sales of high-quality produce from the fresh-use market, which boosted the weighted farm price and subsequently stimulated increased production over time (33, 43). The simulated results from the two studies suggested that permanent suspension of the prorate regulation would likely lead to greater sales of navels and Valencias to the fresh-use market at a lower price, and fewer sales to processing at about the same price. Grower revenue would be lower. Both studies found that annual farm prices and sales to the fresh-use market would be more variable after a continued suspension, while annual prices and sales to processing would be less variable. Handlers of fresh navel oranges may derive some benefits from more stable prices and shipments to the fresh-use market with the prorate regulation. Processors would probably incur higher costs from less stable prices and shipments to processing with the prorate regulation. Consumers may prefer stable supplies and prices of fresh oranges over fluctuating ones.

A related study investigated the impacts of suspending prorate regulations in the California-Arizona navel orange industry for 1-2 seasons (31). The findings suggested that sales to the fresh-use market, farm prices, and grower revenues would be little affected during a short crop year, but farm prices for fresh produce and grower revenue would likely fall if sales to the fresh-use market increased during a large crop year.

The effects of prorate regulation on California-Arizona lemons has been the subject of inquiry in several studies. Smith argued that restricting sales to the fresh-use market can temporarily elevate farm prices, but higher prices would stimulate increased output in the long run, which depresses price toward the free-market level (34). French and Bressler modeled California-Arizona lemon production and illustrated that the lemon production cycle tends to shift upward if sales to the fresh-use market are restricted to maintain specified farm prices (14). The production cycle results partly from biological factors, but its shape can be affected by economic factors, such as farm prices. Kinney and others provided further evidence of the effect of prorate regulation by simulating and comparing farm prices, market uses, output, and grower revenues for alternative prorate policies (22). They found that restricting sales to the fresh-use market would likely boost longrun farm prices even though output would probably be higher.

The consequences of a permanent product diversion to consumers include higher prices for fresh produce and fewer supplies of fresh produce. Consumers of processed products, however, can buy more products at lower retail prices. Some consumers who are unable to afford fresh produce begin to purchase some processed products or more of them. Consumer expenditures for fresh produce and processed products combined together are higher when sales to the fresh-use market are restricted, since the higher expenditures for fresh produce offset the lower expenditures, if any, for processing products.¹² Product diversion encourages growers to produce more output for the lower valued processing-use market and less output for the higher valued fresh-use market in comparison with the free market. Prices may be higher for crops which compete with the diverted crop for land.

Consumers and growers may both benefit from product diversion if it is used only to prevent a sharp decline in grower prices and revenues during large crop years. Permitting growers to divert sales of produce only during large crop years would probably boost low farm prices and reduce down-side income risk. Grower revenues are typically lower

when the crop is larger because the farm-level demand for most crops is price inelastic. The higher price coupled with lower income risk would stimulate production. Consequently, supplies during small crop years would be higher than if there were no diversion. Consumers would benefit from having more supplies at lower farm prices during small crop years, however, they also lose from having fewer supplies of fresh produce at higher prices during large crop years. Consumers would benefit from such a program if benefits during small crop years outweighed the cost during large crop years. Growers would benefit from risk-reduction.

Market Allocations and Reserve Pools

Market allocations place a maximum on the quantity of produce that handlers may ship into regulated markets during a marketing season (see box, "What do market allocations and reserve pools mean..."). While prorates regulate within-season shipment flows, market allocations regulate annual shipment flows. Production in excess of the market allocation can be sold in nonregulated markets or stored and sold in a future period. Six marketing orders for semipermanent crops authorize market allocations (cranberries; California dates, raisins, almonds, and walnuts; and Oregon-Washington hazelnuts).

¹²Expenditures in the processing-use market may rise if the greater quantity results in movement to a less price-responsive portion of the respective demand (that is, a less price-elastic part of the market demand).

What Do Market Allocations and Reserve Pools Mean for the California Almond Farmer?

To better understand how market allocations and reserve pools operate, consider the following example:

Farmer Jones grows almonds in California's San Joaquin Valley and delivers the harvested almonds to a packer-handler, Almonds, Inc., to grade, pack, process, and market the nut. Almonds, Inc., pays Jones for the free percentage of the almonds and holds the reserve pool percentage of almonds for the account of the Almond Board of California (Board). The free percentage is the proportion of the almond crop that can be sold in the domestic and export markets. The reserve pool percentage is the proportion of the almond crop that must be held in storage.

Jones' farm is in California and Almonds, Inc., must abide by the regulations of the Federal marketing order for almonds. Under the marketing order, the Board, subject to the USDA's review and approval, determines the maximum annual quantities that may be sold in the domestic and export markets (the industry's market allocations and the free percentage) and the quantity of almonds that cannot be sold in commercial markets (the industry's reserve pool and the reserve pool percentage) during the current season. The Board takes into account the supply and expected demand for almonds in the domestic and export markets, and sets the quantities of market allocations to avoid market gluts and low farm prices in the domestic and export markets. Initial market allocations to the domestic and export markets are determined at the beginning of the season, but they can be adjusted upward if demand is stronger than the Committee expected. Almonds, Inc.'s share of the market allocations is proportional to the share of total industry production, which it has bought from growers like Jones. Almonds, Inc., places the remaining proportion of the crop into the reserve pool.

Almonds, Inc., can sell up to its share of the market allocations for the domestic and export markets. The almonds in the reserve pool are held in storage until sold or released by the Board. The Board typically releases the almonds in the reserve pool for sale during a year with small supplies. The Board sometimes uses almonds in the reserve pool to develop new products, such as almond butter. Almonds, Inc., may act as an agent of the Board in the sale of its part of the reserve pool in authorized markets. Almonds, Inc., pays Jones the respective annual farm price when the almonds are released from the reserve pool.

Experience has demonstrated that a glut of almonds depresses the price by more than an equal amount of almonds withheld from commercial markets and disposed of in noncommercial markets or carried over and sold during a year with small supplies. If the marketing order causes some almonds to be withheld from the market or disposed of (most likely during large crop years), Jones' returns are higher. Almonds carried over and sold during a year with small supplies result in higher prices to consumers for almonds during large crop years, but lower prices during small crop years.

Reserve pools prohibit handlers from selling a minimum share of the current season's production (see box, "What do reserve pools mean..."). This share of the harvested crop is placed into storage or commonly called the reserve pool and it is shipped to commercial markets when grower prices have strengthened, which usually occurs during a short crop year, or is diverted to processing when there is a chronic buildup of inventory. Five marketing orders for semiperishable crops authorize the reserve pool (California prunes, raisins, almonds, and walnuts; and spearmint oil).

Market allocations and reserve pools are intended to help stabilize interseasonal prices and shipments and, consequently, generate some of the benefits of forward-pricing markets.¹³ Whether market allocations and reserve pools can provide

greater interseasonal stability of prices and shipments than the free market, or other market institutions, is debatable. Some of the potential benefits of more stable prices and shipments were discussed in the section on prorates.

Reserve pools may partly offset a tendency for inventory holders to carry insufficient interyear stocks. Inventory holders have a financial incentive to hold stocks from the current year to the next if the price expected next year exceeds the current year's price plus storage cost in a well-functioning competitive market. The current year's price will be relatively low in a large crop year compared with the next year's expected price, if the next year's expected supplies are normal. Inventory holders carry a larger quantity of stocks from the current year to the next year when the difference between the current year's price and the next year's expected price is wider. The converse is also true. However, uncertainty about next year's price may cause risk-averse inventory holders to experience difficulties forming an accurate expected

¹³ A few of the crops with marketing orders authorizing market allocations and reserve pools have forward-pricing contracts, but these contracts are only for one or two seasons into the future.

What Do Reserve Pools Mean for the California Raisin Farmer?

To better understand how reserve pools operate, consider the following example:

Farmer Baker grows raisins in California's San Joaquin Valley and delivers the harvested raisins to a packer-handler, Raisins, Inc., to grade, pack, and market the fruit. Raisins, Inc., pays Baker for the free percentage of his raisins and holds the reserve percentage of raisins for the account of the Raisin Administrative Committee (Committee). The free percentage is the proportion of the raisin crop that can be sold in commercial markets. The reserve pool percentage is the proportion of the raisin crop that must be held in storage and not sold until authorized by the Committee.

Baker's farm is in California and Raisins, Inc., must abide by the regulations of the Federal marketing order for California raisins. Under the marketing order, the Committee, subject to the USDA's review and approval, determines the quantity of raisins that cannot be sold in commercial markets (the industry's reserve pool and reserve pool percentage) during the current season. The Committee takes into account the supply and expected demand for raisins, and sets the size of the reserve pool to avoid market gluts and a sharp decline in farm prices. The initial level of the reserve pool is determined near the beginning of the season, but it can be adjusted downward as the season progresses. Raisins, Inc., holds the reserve percentage of all the raisins it receives from growers for the account of the Committee. Raisins, Inc., can sell the free percentage of the raisins it receives in commercial markets. Raisins, Inc., pays for the free percentage of the raisins Baker delivers. The raisins in the reserve pool are held in storage until released for sale by the Committee. Baker receives a weighted average of the Committee's returns from sales of reserve raisins.

Experience has demonstrated that a glut of raisins usually depresses the price of raisins by more if sold in commercial markets than if withheld and disposed of in noncommercial markets, or carried over and sold during a year with small supplies. Baker's returns rise if the marketing order causes some raisins to be withheld from sale during a large crop year and sold during a small crop year. Raisins withheld from sale results in higher prices to consumers for raisins during large crop years, but lower prices during small crop years.

Reserve pools may also even out annual supplies, resulting in smaller year-to-year swings in prices and quantities marketed. Greater stability can aid the industry in developing new markets and maintaining established markets in years with small supplies.

price and, consequently, carry less of the commodity than otherwise. Such difficulty may be more prevalent when the free market generates too little information on current and expected supply and demand. An industry with few inventory holders or a monopoly inventory holder also tends to carry fewer stocks from one year to the next as compared with a competitive market (16).

Many of the perennial crops display pronounced alternate-bearing tendencies. That is, a year with large crop yields is followed by a year with small yields. Yield variability is one source of interseasonal price and shipment instability. Market allocations are intended to help stabilize interseasonal prices and shipments in the regulated markets by diverting sales from the regulated markets during large crop years to nonregulated markets. Commodities are principally used in the regulated markets, which are generally more price responsive than the nonregulated markets. Consequently, stabilizing shipments to the regulated market helps to stabilize farm prices more than stabilizing sales to the nonregulated markets. The ability of market allocations to stabilize prices in the regulated market is probably

reduced when supplies of competing crops are erratic and the marketing order covers only a small part of the crop supply.

Market allocations and reserve pools are intended to help an industry develop marketing and product strategies, such as assuring buyers reliable supplies of the produce at stable prices, which can help establish and expand markets for new and existing products. Cherry growers feel that the reserve pool has helped assure a steady supply of the commodity for processed products (29). Processors can be more willing to invest in the development of new products when the input price and supplies are stable because costs are lower. Retailers tend to be more willing to stock and promote a new product whose year-to-year supplies are reliable because many marketers believe that consumers more easily develop product loyalty with products regularly available. Retailers can also more easily plan business, which lowers marketing costs. Many industry members believe that the reserve pool and market allocation regulations helped the almond industry develop new products, such as almond butter and roasted almonds.

Market allocations can divert produce to nonregulated markets if the size of the allocation is less than the amount handlers would ship otherwise. Reserve pools also can divert produce to nonregulated markets if the contents of the pool enter the nonregulated markets. These two volume regulations are controversial because they can permanently divert products to nonregulated markets. The economic effects of product diversion are described in the section on prorates.

The raisin industry initiated a payment-in-kind program in the early 1980's. Growers agreeing to remove planted acreage from production received, as a payment, produce from the reserve pool. The program can help prop low farm prices by reducing bearing acreage and inventories.

Marketing Allotments

Marketing allotments require handlers to market only produce for which the grower possesses a marketing quota (see box, "What do marketing allotments mean..."). Growers can sell only up to their allotted quantities. Marketing allotments indirectly control the maximum output, since growers not possessing allotments would not produce a commodity that cannot be sold. Allotments are normally established by the administrative committee based on growers' historical sales.

Marketing allotments are intended to stabilize year-to-year supply and prices and generate some of the benefits of miss-

ing risk-transferring markets. The potential benefits of stable prices and supplies are discussed in the section on prorates. Whether interseasonal supplies and prices are more stable with a marketing allotment program than the free market, or other market institution, is a question open to further research.

Marketing allotments are intended to stabilize seasonal prices and sales by preventing growers from overplanting because of imperfect information. The effects of overplanting can linger many years, especially for perennial crops, such as the tree nuts and tree fruits. Shortrun effects of overplanting include temporary crop abandonment if the price falls to or below harvesting costs. Medium run effects include lower farm prices and lower orchard values. Once growers have incurred the large sunk cost of developing a viable orchard, they are reluctant to uproot the trees unless the prices fall below production costs for extended periods. Disinvesting perennial crops at a faster rate than the depreciation rate is costly for growers.

Marketing allotments are the most controversial of the marketing order regulations because they potentially have the greatest market power. Growers can cooperatively act as a monopoly if the marketing order completely covers production of the crop. A monopoly usually sells less produce at higher prices than do competitive producers (see appendix II) (9). Consumers consequently face higher prices and smaller quantities of the commodity. A monopoly tends to produce less output as compared with a competitive market.

What Do Marketing Allotments Mean for the Washington Spearmint Oil Farmer?

To better understand how marketing allotments operate, consider the following example:

Farmer Douglas grows spearmint in Washington State, distills the spearmint oil out of the spearmint, and sells the oil to a handler, Spearmint, Inc., to market the oil to food processors. Spearmint oil is used mostly in products such as chewing gums, mouthwash, confections, and cooking ingredients.

Douglas' farm is in Washington State and Spearmint, Inc., must abide by the regulations of the Federal marketing order for spearmint oil. Under the marketing order, the Spearmint Administrative Committee (Committee), subject to the USDA's review and approval, determines the quantity of marketing allotments for the marketing order area during the season. The Committee takes into account the supply and expected demand for spearmint oil, and sets the quantity of marketing allotment to avoid market gluts and a sharp decline in farm prices. Marketing allotments for the current season are determined before the crop is planted. Douglas' share of the marketing allotment is equal to his historical share of the industry base sales times the industry's allotment percentage for the season. Douglas can grow as much spearmint as he wants, but can only market spearmint for which he has an allotment. If Douglas produces oil in excess of his marketing allotment, he may put the excess oil in the reserve pool. The Committee sometimes increases the allotment percentage if demand is stronger than the Committee expected. Douglas may then use any oil he placed in the reserve pool to fill his increased allotment.

The reserve pool can help smooth out annual supplies and prices by carrying supplies from large crop years over to small crop years. However, farm prices are higher if growers like Douglas produce less under the allotment program than otherwise. Consumer prices are unlikely to increase much if the allotment persistently restricts production since spearmint oil constitutes a small share of the total cost of the products that contain spearmint oil.

Growers seldom can act as a monopoly, in practice, since the marketing orders authorizing allotments usually cover only a part of the crop's potential growing area and entry by new growers and expansion by existing growers is permitted.

The net effect of marketing allotment regulations depends on their use. Preventing overplanting, when some growers have overoptimistic price expectations, reduces losses from crop abandonment and overinvesting. Allotment regulations, however, used to permanently restrict production would likely benefit growers at consumers' expense. Allotments in the marketing orders for cranberries have never been used. Although allotments are set for Florida celery and spearmint oil, their effectiveness in raising prices appears limited. Any attempt on the part of Florida celery growers to raise prices by reducing sales would likely be thwarted by increased marketings of California celery. Growth in imports and expanded domestic production in nonmarketing order States would likely counter high spearmint oil prices caused by an allotment restricting spearmint oil production in the marketing order area. All of the marketing orders authorizing marketing allotments (cranberries, Florida celery, and spearmint oil) provide for assigning some allotments to new and existing growers each season, thus limiting the allotment's potential ability to restrict output.

Other Functions

The enabling legislation authorizes the administrative committee of each marketing order to collect and disseminate information on production, shipment flows, and inventories. This regulation helps individual growers and handlers overcome some economies of scale, imperfect information, and asymmetric information problems. Individual handlers and growers generally spend too little on market information since some types of information enters the public domain. Wide dissemination of information is essential for a free market to operate efficiently.

Information is not a free good since resources must be expended to gather statistics and interpret them. Handlers and growers have a financial incentive to collect information until the cost of collecting the information just equals its benefits. Handler and grower benefits include increased profits because of better planning, hence, lower costs, and the opportunity to take advantage of changing markets.

Wide dissemination of market information can improve the bargaining power of small- and medium-sized handlers by providing information comparable with that of buyers. Buyers, such as large-sized food processors and major regional and national retailers, who possess superior market information because they are geographically widespread and well financed, may otherwise use their superior information to bargain for a lower selling price from handlers (42).

The enabling legislation also authorizes the Secretary of Agriculture to prevent handlers and growers from engaging in unfair methods of competition and trade practices. The norms applied to delineate fair methods of competition and trade practices from unfair methods vary across industries and over time. A marketing order provides a social forum whereby handlers and growers can reach a consensus on what constitutes fair methods of competition and trade practices.

The administrative committee is responsible for helping to resolve industry conflicts, such as business differences between handlers and growers, in addition to defining unfair competition for the subject under the purview of marketing orders. The social forum of a marketing order may provide the most cost-effective institution for settling business differences when the industry has expertise and knowledge in the area. Other institutions may be unworkable because of a lack of expertise and, therefore, become too cumbersome and expensive.

References

1. Berck, Peter, and Jeffrey M. Perloff. "A Dynamic Analysis of Marketing Orders, Voting, and Welfare," *American Journal of Agricultural Economics*, 67(1985): 487-496.
2. Blaylock, James R., and William N. Blisard. *Effects of Advertising on the Demand for Cheese*. TB-1752. U.S. Dept. Agr., Econ. Res. Serv., December 1988.
3. Blinder, A. S. "Inventories and Sticky Prices: More on the Microfoundations of Macroeconomics," *American Economic Review*, 72(1982): 334-348.
4. Bocksteal, Nancy E. "The Welfare Implications of Minimum Quality Standards," *American Journal of Agricultural Economics*, 66(1984): 466-471.
5. _____. "Economic Efficiency Issues of Grading and Minimum Quality Standards," *Economic Efficiency in Agricultural and Food Marketing*. Editors, Richard L. Kilmer and Walter J. Armbruster. Iowa State University Press. 1987. Pages 231-250.
6. Carlton, Dennis W. "The Rigidity of Prices," *American Economic Review*, 76(1986): 637-658.
7. Carman, Hoy F., and Daniel H. Pick. "Marketing California-Arizona Lemons Without Marketing Order Shipment Controls," *Agribusiness: An International Journal*, 4(1988): 245-259.

8. Clarke, D. G. "Econometric Measurement of the Duration of Advertising Effects on Sales," *Journal of Marketing Research*, 13(1976): 345-357.
9. Cohen, Kalman J., and Richard M. Cyert. *Theory of the Firm: Resource Allocation in a Market Economy*. Prentice-Hall, Inc. 1975.
10. Cornell University, Department of Agricultural Economics. *Generic Agricultural Commodity Advertising and Promotion*. Editors, Walter J. Armbruster and Robert L. Wills. A. E. Ext. 88-3. March 1988.
11. Ehrlich, Isaac, and Lawrence Fisher. "The Derived Demand for Advertising: A Theoretical and Empirical Investigation," *American Economic Review*, 72(1982): 366-388.
12. Farrell, Kenneth R. *Federal and State Enabling Legislation for Fruit and Vegetable Marketing Orders: Evolution and Current Status*. Supplement No. 3 to Technical Study No. 4. Report of the National Commission on Food Marketing. June 1966.
13. Farris, Paul W., and Mark S. Albion. "The Impact of Advertising on the Price of Consumer Products," *Journal of Marketing*, 44(1980): 17-35.
14. French, Ben C., and Raymond G. Bressler. "The Lemon Cycle," *Journal of Farm Economics*, 44(1962): 1021-1036.
15. French, Ben C. "Fruit and Vegetable Marketing Orders: A Critique of the Issues and State of Analysis," *American Journal of Agricultural Economics*, 64(1982): 916-923.
16. Gardner, Bruce. "Efficiency in Commodity Storage," *Economic Efficiency in Agricultural and Food Marketing*. Editors, Richard L. Kilmer and Walter J. Armbruster. Iowa State University Press. 1987. Pages 274-285.
17. Gordon, Robert J. "Output Fluctuations and Gradual Price Adjustment," *Journal of Economic Literature*, 19(1981): 493-530.
18. Hallagan, William S. "Contracting Problems and the Adoption of Regulatory Cartels," *Economic Inquiry*, 23(1985): 37-56.
19. Hart, O. "On the Optimality of Equilibrium When the Market Structure is Incomplete," *Journal of Economic Theory*, 11(1975): 418-443.
20. Heifner, Richard, Walter Armbruster, Edward Jesse, Glenn Nelson, and Carl Shafer. *A Review of Federal Marketing Orders for Fruits, Vegetables, and Specialty Crops: Economic Efficiency and Welfare Implications*. AER-477. U.S. Dept. Agr., Agr. Mktg. Serv., November 1981.
21. Jesse, Edward V., and Aaron C. Johnson, Jr. *Effectiveness of Federal Marketing Orders for Fruits and Vegetables*. AER-471. U.S. Dept. Agr., Econ. Res. Serv., June 1981.
22. Kinney, William, Hoy Carman, Richard Green, and John O'Connell. *An Analysis of Economic Adjustments in the California-Arizona Lemon Industry*. Giannini Foundation Research Report No. 337. California Agricultural Experiment Station. April 1987.
23. Kinnucan, Henry, and Olan D. Forker. "Seasonality in the Consumer Response to Milk Advertising with Implications for Milk Promotion Policy," *American Journal of Agricultural Economics*, 68(1986): 562-571.
24. Lipsey, R. G., and R. K. Lancaster. "The General Theory of the Second Best," *Review of Economic Studies*, 24(1956): 11-32.
25. Newberry, D. M. G., and Joseph E. Stiglitz. *The Theory of Commodity Price Stabilization: A Study in the Economics of Risk*. Oxford:Clarendon Press. 1981.
26. Nguyen, Dung, and Trang T. Vo. "On Discarding Low Quality Produce," *American Journal of Agricultural Economics*, 67(1985): 614-618.
27. Nichols, John P. "Economic Efficiency Issues of Grading and Minimum Quality Standards: A Discussion," *Economic Efficiency in Agricultural and Food Marketing*. Editors, Richard L. Kilmer and Walter J. Armbruster. Iowa State University Press. 1987. Pages 251-255.
28. Peltzman, Sam. "Toward a More General Theory of Regulation," *The Journal of Law and Economics*, 19(1976): 211-240.
29. Polopolus, Leo C., Hoy F. Carman, Edward V. Jesse, and James D. Shaffer. *Criteria for Evaluating Federal Marketing Orders: Fruits Vegetables, Nuts, and Specialty Commodities*. A report prepared by an independent marketing order study team published through U.S. Dept. Agr., Econ. Res. Serv., December 1986.
30. Posner, Richard A. "Theories of Economic Regulation," *Bell Journal of Economics and Management Science*, 5(1974): 335-358.
31. Powers, Nicholas J., Glenn A. Zepp, and Frederic L. Hoff. *Assessment of A Marketing Order Prorate Suspension: A Study of California-Arizona Navel Oranges*. AER-557. U.S. Dept. Agr., Econ. Res. Serv., June 1986.
32. Rausser, Gordon C., Jeffery M. Perloff, and Pinhas Zusman. "The Marketing System: The Relevance of Economic Efficiency Measures," *Economic Efficiency in Agricultural and Food Marketing*. Editors, Richard L. Kilmer and Walter J. Armbruster. Iowa State University Press. 1987. Pages 3-31.

33. Shepard, Lawrence. "Cartelization of the California-Arizona Orange Industry, 1934-1981," *Journal of Law and Economics*, 29(1986): 83-123.
34. Smith, Roy J. "The Lemon Prorate in the Long Run," *Journal of Political Economy*, 69(1961): 573-586.
35. Stigler, George J. "The Theory of Economic Regulation," *Bell Journal of Economics and Management Science*, 2(1971): 3-21.
36. _____. "Free-Riders and Collective Action," *Bell Journal of Economics and Management Science*, 5(1974): 359-365.
37. Stigler, George J., and Gary S. Becker. "De Gustibus Non Est Disputandum," *American Economic Review*, 67(1977): 76-90.
38. Stiglitz, Joseph E. "Equilibrium in Product Markets With Imperfect Information," *American Economic Review, Papers and Proceedings*, 69(1979): 339-345.
39. _____. *Economics of the Public Sector*. W. W. Norton and Company. 1986.
40. Sun, Theresa. *Quality Demand and Policy Implications for Florida Green Tomatoes*. TB-1728. U.S. Dept. Agr., Econ. Res. Serv., August 1987.
41. Teigen, Lloyd D. *Agricultural Parity: Historical Review and Alternative Calculations*. AER-571. U.S. Dept. Agr., Econ. Res. Serv., June 1987.
42. Telser, Lester G. *Theories of Competition*. North-Holland. Elsevier Science Publishing Co., Inc. 1988.
43. Thor, Peter K., and Edward V. Jesse. *Economic Effects of Terminating Federal Marketing Orders for California-Arizona Oranges*. TB-1664. U.S. Dept. Agr., Econ. Res. Serv., November 1981.
44. Tomek, William G., and Kenneth L. Robinson. *Agricultural Product Prices*. Ithaca, New York: Cornell. 1981.
45. U.S. Department of Agriculture, Agricultural Marketing Service. *Marketing Agreement and Order Operations Manual*. September 1987.
46. _____. *Guidelines for Fruit, Vegetable, and Specialty Crop Marketing Orders*. January 25, 1982.

Appendix I: Effects of Product Diversion

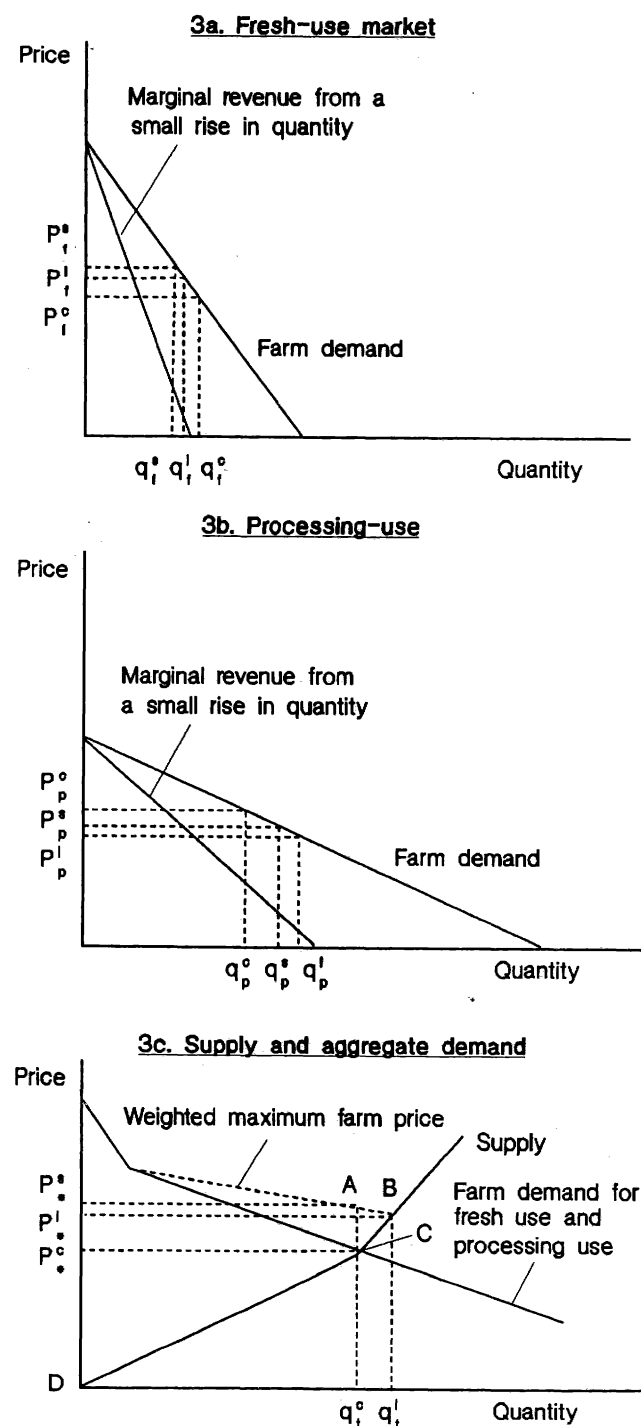
The shortrun and longrun effects of restricting sales of fresh-quality produce to the fresh-use market over an extended period are illustrated using figures 3a-3c. Figure 3a indicates that consumers demand more fresh produce at a lower price and figure 3b reveals that consumers demand more processed products at a lower price. The marginal revenue measures the change in revenue in the market when sales to the market change by a small amount. The marginal revenue in each market falls as sales rise. The marginal revenue in the processing-use market is higher than in the fresh-use market, except when sales are small. This difference means that the fall in revenue from a small increase in sales to processing is less than the rise in revenue from a small decrease in sales to fresh use. The total demand (the horizontal summation of the demands in the fresh-use and processing-use markets), as presented in figure 3c, shows that consumers demand more produce as the weighted price falls. The supply of output indicates that farmers grow more produce at a higher weighted price. The dashed line lying above the aggregate demand and labeled "weighted maximum farm price" shows the price received by growers when the crop is allocated between fresh use and processing so as to maximize grower revenue. Grower revenue is maximized by allocating a given supply between the fresh-use and processing-use markets until the marginal revenue in the two markets is equal.

In real world markets, the price in the fresh-use market is usually greater than in the processing-use market because higher quality produce enters fresh use. To easily illustrate the implications of a product diversion, we assume that in a free market, prices in fresh use and processing and the weighted average farm price are equal ($P_f^c = P_p^c = P_*^c$) and output is q_f^c . Thus, in a free market, sales to fresh use are q_f^c and sales to processing use are q_p^c .

The shortrun effects of product diversion can be evaluated by comparing the free-market outcome with allocating the quantity supplied in a free market in a way to maximize grower revenues. While it is unlikely growers could use prorate regulation to maximize revenue, we consider this alternative to illustrate the potential implications of a product diversion. Growers are unlikely to maximize revenue because information is inexact and the goals and beliefs among growers differ. The short run is defined as the period of time when growers are unable to adjust (expand or contract) their level of output. Growers of tree crops can expand production in about 5-7 years. Growers of tree crops can contract production during 1-2 seasons. Growers of annual crops can expand and/or contract production in a year. Sales to fresh use are lower and the price for fresh produce is higher in the short run, while sales to processing are higher and the price for processed produce is lower. The weighted maximum farm price and grower revenue are higher, how-

ever. Growers divert produce to processing until the marginal revenues in the processing-use and fresh-use markets are equal. Thus, sales to fresh use are q_f^s and sales to processing are q_p^s and the corresponding fresh price is P_f^s and the processing price is P_p^s . The weighted maximum farm price is P_*^s . Grower revenue is higher by the area $P_*^s \cdot A \cdot q_i^c \cdot D$ less $P_*^s \cdot C \cdot q_i^c \cdot D$.

Figure 3
Effects of product diversion



The longrun effects of a permanent product diversion are different than the shortrun effects. The long run is a period of time sufficiently long for growers to complete production adjustments. The long run for tree crop expansion is about 10-12 years, whereas expansion of annual crops, such as lettuce, tomatoes, or potatoes, can usually occur in about 1-2 years. In response to a sustained higher farm price, profit-maximizing growers expand output until the marginal cost of producing an additional unit of output equals the weighted maximum farm price, as given by point B in figure 3c. Growers expand output to q_i^l in the long run and the weighted maximum farm price is P_*^l . As output increases, growers divert more produce to processing and continue to equate the marginal revenues in fresh-use and processing-use markets. While sales to the fresh-use market in the long run (q_f^l) are lower than in the free market, sales to the fresh-use market in the long run are higher than in the short run with a product diversion. The price for fresh produce is higher in the long run (P_f^l) as compared with the free market, but price is lower in the long run as compared with in the short run with a product diversion. Sales to processing in the long run (q_p^l) are higher than in the short run with a product diversion. The price of processing produce is lower in the long run (P_p^l) as compared with either the shortrun product diversion or the free market. Grower revenue is higher in the long run ($P_*^l \cdot B \cdot q_i^l \cdot D$) as compared with the free market, but revenue is not necessarily higher in the long run as compared with in the short run with a product diversion.

The weighted maximum farm price is less in the long run than in the short run with a product diversion because of higher output, but farm price is higher in the long run than in the free market. Product diversions tend to elevate the weighted maximum farm price more when production is less responsive to a higher price. Production tends to be less responsive when inputs, such as water, fertilizer, and labor, and arable land suitable for growing the crop, are limited. More production inputs can frequently be supplied without much of an increase in their prices. Land, however, can be a limiting input factor in production, since some horticultural crops can only be grown in a narrow geographic area endowed with desirable climatic and soil characteristics. Land may come from competing crops, which would lower production of the competing commodities and elevate farm prices.

The higher revenues are typically capitalized into the price of limited factors of production, such as the land suitable for growing the produce. The wealth of landowners at the initiating time of the product diversion program is boosted, but land becomes more expensive for new and expanding growers (1). New landowners lose equity if the product diversions are discontinued because land is revalued at the lower free-market level. Farm creditors may be exposed to more credit risk if unpredictable program changes lower land values.

Appendix II: Potential Effects of Marketing Allotments

The effects of marketing allotments are illustrated in figure 4. The demand indicates that consumers buy more of a commodity when the price falls. The free-market supply indicates that growers produce more output when the farm price rises. Growers produce the quantity of output where the supply curve intersects the demand curve (q^f) and receive the market clearing price of P^f in a free market. The marketing allotment does not affect the level of prices unless the allotted quantity is less than the free-market output. For example, the producer allotment of quantity q^n exceeds the free-market output and, consequently, has no effect on the price. But, the allotted quantity of q^r restricts output and, thus, lifts price to P^r .

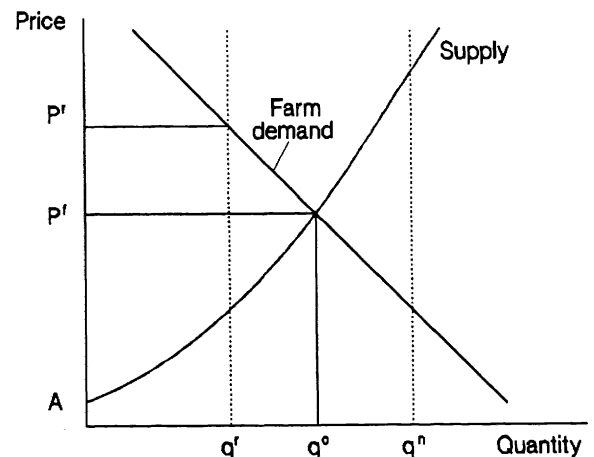
Allotments take on value when they successfully restrict the free-market output and elevate price because allotments are transferable rights. The allotment value equals the difference between grower revenue and total cost of production inputs.

In the real world, marketing orders authorizing allotments provide for assigning some allotments to new and existing growers each year, thus, reducing the allotment's ability to restrict output. In most marketing orders, allotments appear with other volume control regulations, such as the

reserve pool. An allotment, when used with a reserve pool, may help stabilize annual prices and supplies. The box on marketing allotments discusses how growers use the allotment and reserve pool in the spearmint marketing order.

Figure 4

Effects of marketing allotments



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